APPENDICES

Appendix 7-A
EU Directives / National Legislation and Regulations / Guidelines / Technical Standards

European Directives

- Environmental Impact Assessment. Directive (2011/92/EU) on the assessment of the effects of certain public and private projects on the environment;
- Environmental Impact Assessment Directive (2014/52/EU) on the assessment of the effects of certain public and private projects on the environment;
- Water Framework Directive (2000/60/EC);
- Groundwater Directive (2006/118/EC);
- Flooding Directive (2007/60/EC);
- Integrated Pollution and Prevention Control Directive (2008/1/EC); and,
- The management of waste from extractive industries (2006/21/EC).

Irish Government Acts, National Legislation and Regulations

- S.I. No. 349 of 1989, European Communities (Environmental Impact Assessment) Regulations, and subsequent amendments (S.I. No. 84 of 1994, S.I. No. 352 of 1998, S.I. No. 93 of 1999, S.I. No. 450 of 2000 and S.I. No. 538 of 2001);
- The Planning and Development Acts, 2000 to 2009, The Planning and Development (Amendment) Act 2010, S.I. 600 of 2001 Planning and Development Regulations and subsequent amendments including, S.I. No. 364 of 2005 and S.I. 685 of 2006.

National legislation on the protection of the water environment. Since 2000 water management in EU member states has primarily been directed by the Water Framework Directive (2000/60/EC) and the associate 'daughter' Groundwater Directive (2006/118/EC). Irish legislation implementing these, and other relevant directives currently includes:

- S.I. No. 9 of 2010 European Communities Environmental Objectives (Groundwater) Regulations 2010 and amendments (S.I. No. 389 of 2011 and S.I. No. 149 of 2012);
- European Union (Drinking Water) Regulations 2014 (S.I. No. 122 of 2014);
- S.I. No. 278 of 2007 European Communities (Drinking Water) (No. 2) Regulations;
- S.I. No. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations 2009 and amendment (S.I. No. 327 of 2012);
- S.I. No. 684 of 2007 Waste Water Discharge (Authorisation) Regulations, 2007, as amended (S.I. No. 231 of 2010);
- S.I. No. 122 of 2010 European Communities (Assessment and Management of Flood Risks) Regulations 2010;
- S.I. No. 457 of 2008 European Communities (Environmental Liability) Regulations which bring into force the European Liability Directive (2004/35/EC);
- European Union (Planning and Development) (Environmental Impact Assessment) (No. 2) Regulations 2018 (S.I. No. 404 of 2018);
- Local Government (Water Pollution) Acts 1977 to 1998;
- European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. No. 293 of 1988);
- European Communities (Quality of Shellfish Waters) Regulations, 2006 (S.I. No. 268 of 2006) and amendments (S.I No. 55 and 464 of 2009), and;

- Bathing Water Quality Regulations, 2008 (S.I. No. 79 of 2008) and amendments (S.I No. 351 of 2011 and S.I. No. 163 of 2016).

Guidelines

- CIS (2007). Common Implementation Strategy (CIS) for the Water Framework Directive (2000/60/EC) Guidance on preventing or limiting direct and indirect inputs in the context of the Groundwater Directive 2006/118/EC. Guidance Document No. 17.
- CIS (2010). Common Implementation Strategy (CIS) for the Water Framework Directive (2000/60/EC). Guidance on risk assessment and the use of conceptual models for groundwater. Guidance document No. 26.
- DEHLG (2004). National Urban Waste Water Study. National Report.
- DEHLG (2009). Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities.
- DELG/EPA/GSI (1999). Groundwater Protection Schemes. Document prepared jointly by the Geological Survey of Ireland (GSI), the Environmental Protection Agency, and the Department of Environment, Heritage and Local Government.
- EPA (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.
- EPA (2010b). Methodology for Establishing Groundwater Threshold Values and the Assessment of Chemical and Quantitative Status of Groundwater, Including and Assessment of Pollution Trends and Trend Reversal.
- EPA (2011). Guidance on the Authorisation of Discharges to Groundwater. Version 1, December 2011.
- EPA (2003). Towards Setting Guideline Values for the Protection of groundwater in Ireland. Interim Report.
- EPA (2006). Ireland Water Framework Directive Monitoring Programme.
- Fitzsimons, V., Daly, D. and Deakin, J. (2003). Draft GSI guidelines for assessment and mapping of groundwater vulnerability to contamination. Groundwater Chapter, Geological Survey of Ireland.
- GSI (2006). Criteria used in aquifer classification. 1Available from http://www.gsi.ie/Programmes/Groundwater/Aquifer+Classification.htm.
- IGI (2007). Guidelines on Water Well Construction. Available from http://www.igi.ie/assets/files/Water%20Well%20Guidelines/Guidelines.pdf.
- Kilroy, G., Dunne, F., Ryan, J., O'Connor, A., Daly, D., Craig, M., Coxon, C., Johnston, P. and Moe, H. (2008). A Framework for the Assessment of Groundwater – Dependent Terrestrial Ecosystems under the Water Framework Directive. Environmental Research Centre Report Series No. 12.
- Institute of Geologists of Ireland, 2007. Recommended collection, presentation and interpretation of geological and hydrogeological information for quarry developments.

Technical Standards

- British Standards (2015). Code of Practice for Ground Investigations BS5930:2015;
- CIRIA (2007). The SuDS Manual. (C697). CIRIA publication, February 2007.

Appendix 7-B
Site Suitability Assessment and Wastewater Treatment System

JBA John Barnett & Associates

CSA House
6/7 Dundrum Business Park
Windy Arbour
Dublin 14, Ireland

Tel: +353-1-296 4667
Fax: +353-1-296 4676
email: tpaul@csa.ie
www.csa.ie

JBA3238/R01/pg/js

Kilsaran Concrete Ltd,
Pierceton, Dunboyne,
Co. Meath.

17th June 2004.

RE: Percolation Tests, Well Inventory and Aquifer Classification for Kilrathmurry. Co. Kildare.

Introduction

John Barnett & Associates Ltd were requested by Kilsaran Concrete Ltd. to undertake the following items for their site at Kilrathmurry;

a) an inventory of wells within 500m of the site,
b) site characterisation for waste water treatment system, and
c) an aquifer classification,

Well Inventory.

An inventory of all wells, domestic and commercial, was undertaken for the site and within 500m of the proposed extraction area. The well age, well depth, depth to groundwater, type of well and the function of the wells is shown in Appendix A. The locations of the wells are shown on Figure 6.1.

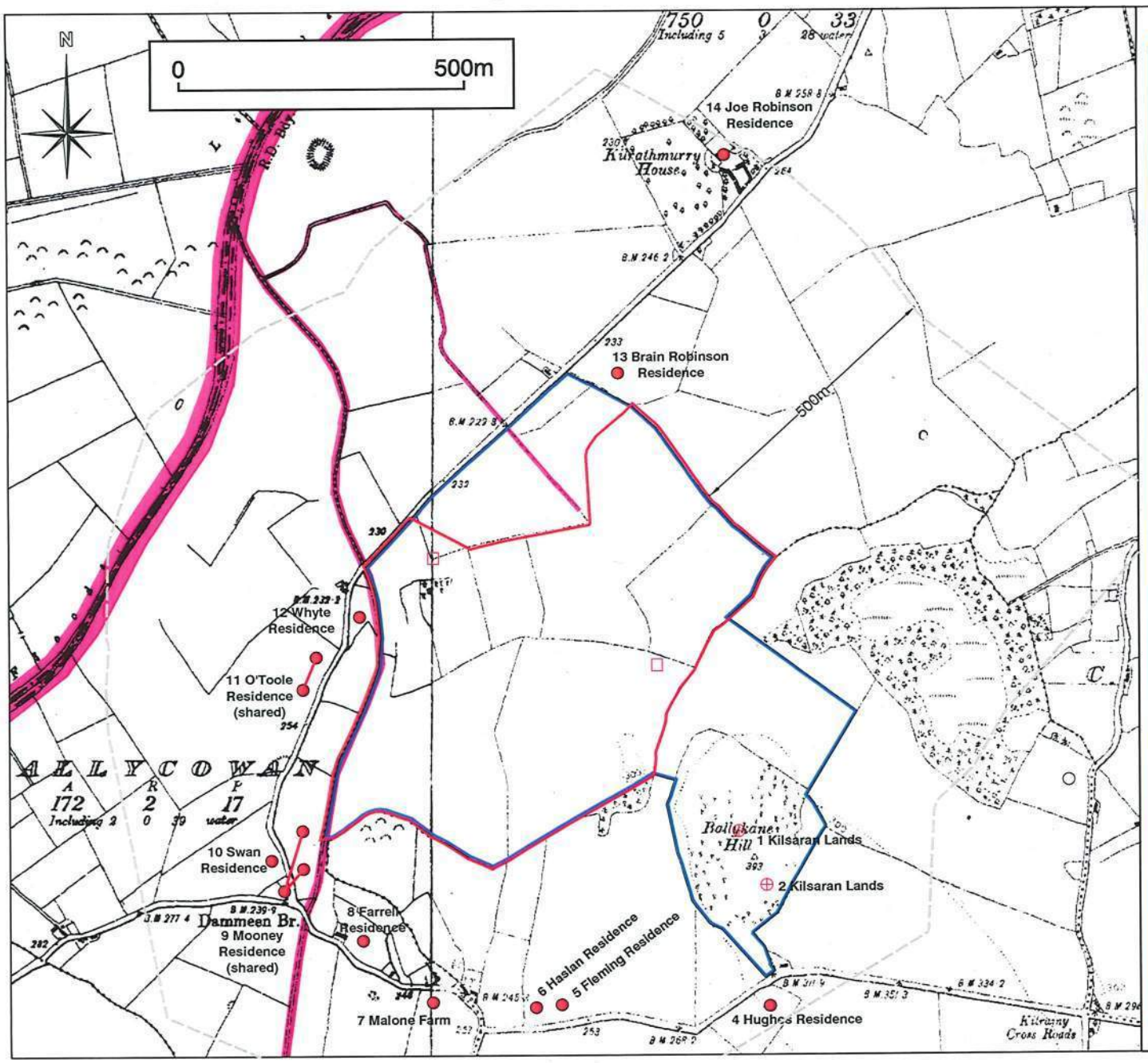
Site characterisation for waste water treatment system.

A site characterisation was undertaken for each of the 2 no. locations of the proposed wastewater treatment systems at the site. The locations of the 2 no. proposed wastewater treatment systems are shown on the Site Layout Plans (1/500) submitted with the planning application (specifically Figures 3.3SLi and 3.3SLii). The site characterisation was completed in accordance with the EPA Wastewater Treatment Manual "Treatment Systems for Single Houses" and the DOELG/EPA/GSI 'Groundwater Protection Response for on-Site Wastewater Systems for Single Houses'. The completed site characterisation forms are shown in Appendix B. Based on the results of this report Bord Na Mona has specified the detail design for the proprietary effluent treatment systems as shown in Appendix C. Adjoining wells and surface water courses are shown on Figure 6.1 attached.

Aquifer Classification.

No aquifer classification map is currently available for County Kildare. However, it was indicated that the aquifer at the site at Kilrathmurry is classified as Lg - Locally important sand/gravel Aquifer (Geological Survey of Ireland Groundwater Section, personal communication 01/06/2004).

FIGURES



KCP GROUP

LEGEND

- Application Area
- Freehold of Applicant
- Residence within 500m of Proposed Extraction Area
- Streams & Ditches on, Bordering or Adjacent to the Site
- Approx Location of Wastewater Treatment Systems

Proposed Development at:-

KILRATHMURRY, County Kildare

Date:- June 2004

Scale:- 1/10,560

Drawn By:-

Fergus Gallagher ASCS, MRICS
Chartered Minerals Surveyor
Kilsaran Concrete Ltd., Dunboyne, Co Meath

Based on Ordnance Survey 6" Sheets 2 & 7 Co. Kildare

WELL LOCATIONS

FIGURE 6.1

APPENDIX A

Well Inventory

Well Inventory - KCP, Kilrathmurry, Co. Kildare.

Date: 26th May 2004

Well no.	Installation Date	Location	WellDepth	Depth to Groundwater	Borehole Type	Use	Comments
1	1999	Kilsaran Lands	49.6m	43.8m	Bored	Observation	
2	1999	Kilsaran Lands	45.1m	36.32m	Bored	Observation	
3	Plant	Kilsaran Lands		na.	Bored	Aggregate Washing	
4	na.	Hughes Residence	na.	1.1m	Bored	Domestic	
5	na.	Fleming Residence	na.	na.	Bored	Domestic	Well Not Accessible
6	na.	Haslan residence	na.	na.	Bored	Domestic	No Response
7	na.	Malone Farm	na.	c. 2m	Bored	Domestic	Pers comm.
8	na.	Farrell Residence	na.	na.	Bored	Domestic	Well Not Accessible
9	na.	Mooney Residence	na.	4.09m	Bored	Domestic	
10	na.	Swan Residence	na.	4.2m	Bored	Domestic	
11	na.	O'Toole Residence	na.	4.7m	Bored	Domestic	
12	na.	Whyte Residence	na.	na.	Bored	Domestic	Well Not Accessible
13	na.	Brian Robinson Residence	na.	na.	Bored	Domestic	No Response
14	na.	Joe Robinson Residence	na.	na.	Bored	Domestic	No Response

The well Locations are shown on attached Figure KCL302 .

APPENDIX B

WASTE WATER TREATMENT - SITE CHARACTERISATION

EPA Wastewater Treatment Manual; Treatment Systems for Single Houses

APPENDIX A: SITE CHARACTERISATION FORM

1.0 GENERAL DETAILS (From planning application)

PLANNING APPLICATION Ref. no.:	KILDARE CO. CO. PLAN REF. 27541/03
NAME & ADDRESS OF APPLICANT:	KILSARAN CONCRETE LTD. PIERCETOWN, DUNBOYNE, CO. MEATH
SITE LOCATION AND TOWNLAND:	KILRATH MURRY
TELEPHONE NO: 01 8251311 **FAX NO:** 01 8251782 **E-MAIL:**	FERGUS.GALLAGHER@KILSARAN.IE.
MAXIMUM NO. OF RESIDENTS: 4 **NO. OF DOUBLE BEDROOMS:** N/A **NO. OF SINGLE BEDROOMS:** N/A	
PROPOSED CAPACITY OF SEPTIC TANK (litres) (if applicable): 4 m^3 **NUMBER OF CHAMBERS:** 2	

PROPOSED WATER SUPPLY: (tick as appropriate)	mains	private well/borehole	group well/borehole
		✓	

2.0 DESK STUDY PERCOLATION AREA 1. SITE ENTRANCE

Soil type: MINERAL SOIL	**Bedrock type:** LIMESTONE
Subsoil type: GLACIO FLUVIAL	**Aquifer type:** LOCALLY IMPORTANT SAND/GRAVEL AQUIFER
Vulnerability class: HIGH	**Groundwater protection response:** ACCOMODATE SUBJECT TO NORMAL GOOD PRACTICES

Presence of significant sites (archaeological, natural and historical):

NONE

Zoning in county development plan: PLAINLANDS: (c) NORTH WEST KILDARE

Past experience in the area:

N/A

Comments:

(Integrate the information above in order to comment on: the potential suitability of the site, potential targets at risk, and/or any potential site restrictions).

"ACCEPTABLE subject to normal good practice" NO POTENTIAL TARGETS AT RISK AND/OR POTENTIAL SITE RESTRICTIONS IDENTIFIED.

Sketch of site showing measurement to Trial Hole location and Percolation Test Hole locations, wells and direction of groundwater flow, proposed house (incl. distances from boundaries) adjacent houses, watercourses, significant sites and other features. North point should always be included.

[A copy of the site layout drawing should be used if available]

SEE FIGURE KCC 303

3.0 ON-SITE ASSESSMENT

3.1 Visual Assessment

TOPOGRAPHY: HILLY	**SLOPE:**
LANDSCAPE: AGRICULTURAL	STEEP (>1:5) SHALLOW (1:5-1:20)
GEOLOGY: LIMESTONE BEDROCK QUATERNARY SAND + GRAVEL	RELATIVELY FLAT (<1:20)

SURFACE FEATURES:

OUTCROPS NONE

HOUSES SEE FIGURE 302

DITCHES* NONE

WELLS* SEE WELL INVENTORY

SPRINGS NONE

KARST FEATURES NONE

ROADS 3rd CLASS ROAD 51m NORTH WEST OF SITE.

WATERCOURSE* STREAM 100m WEST OF SITE, STREAM IS UP GRADIENT OF PERCOLATION AREA

LAKES/SURFACE WATER PONDING/
BEACHES/SHELLFISH AREAS/WETLANDS NONE

SITE BOUNDARIES SEE FIGURE 302

EXISTING LAND USE AGRICULTURAL GRAZING WITHIN EXISTING QUARRY DEVELOPMENT

* note water level

LOCAL DRAINAGE: SUBSURFACE TO NORTH EAST

TYPE OF VEGETATION: PASTORAL

GROUND CONDITION: GOOD

COMMENTS:

(Integrate the information above in order to comment on: the potential suitability of the site, potential targets at risk, the suitability of the site to treat the wastewater and the location of the proposed system within the site).

THERE ARE NO TARGETS AT RISK FROM THE LOCATION OF THE PERCOLATION AREA AT THE PROPOSED LOCATION.

3.2 Trial Hole

Hole should be approximately 1m x 0.75m in plan and a minimum of 2.1 m deep

Depth of Trial Hole (m):	2.1m	**Date and time of Excavation:** 26/05/04 11:30	**Date and time of Examination:** 26/05/04 11:30

Depth from ground surface to bedrock (m): Na.

Depth from ground surface to water table (m): Na.

Soil type: MINERAL SOIL **Subsoil type:** GLACIO FLUVIAL SAND and GRAVEL

	Additional Soil/Subsoil Information				
	Texture	**Structure**	**Bulk density**	**Colour***	**Preferential flowpaths**
0.1 m	TOPSOIL	Slightly clayey silty GRAVEL	LOW	DARK BROWN	NONE
0.2 m					
0.3 m					
0.4 m					
0.5 m	SAND and	GRAVEL	LOW – MEDIUM	LIGHT GREY	NONE
0.6 m					
0.7 m					
0.8 m					
0.9 m					
1.0 m					
1.1 m					
1.2 m					
1.3 m	SAND		MEDIUM	LIGHT GREY	NONE
1.4 m					
1.5 m					
1.6 m					
1.7 m					
1.8 m	slightly SILT	sandy	MEDIUM	LIGHT ORANGE ↓ GREY WITH DEPTH	NONE
1.9 m					
2.0 m					
2.1 m					
2.2 m					
2.3 m					
2.4 m					
2.5 m					

Other information (e.g. depth of water ingress)

NO GROUNDWATER

NO SIGNS MOTTLING IN SUBSOIL

* All signs of mottling should be recorded

3.3 Percolation Test

Type of test: T-Test ☑ or P-Test ☐

Percolation Test Hole	1	2
Depth from ground surface to top of hole (mm) (A)	0	100
Depth from ground surface to base of hole (mm) (B)	400	500
Depth of hole (mm) [B - A]	400	400
Dimensions of hole [length x breadth (mm)]	500 x 420	410 x 510

Each hole must be pre-soaked twice before the test is carried out (from 10.00 am to 5.00 pm and from 5.00 pm to next morning)

Date of test:	28-05-04	28-05-04
Date pre-soaking started:	26-05-04	26-05-04
Time filled to 400 mm	0	0
Time water level at 300 mm	18 min	6 min

Percolation Test Hole No.	1			2		
Fill no.	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)
1	18 min	51 min	33	6 min	16 min	10
2	0	41 min	41	0	9 min	9
3	0	45 min	45	0	13 min	13
Average Δt			40	Average Δt		11

Average Δt/4 = [Hole No.1] 10 (t_1) Average Δt/4 = [Hole No.2] 3 (t_2)

T value = $(t_1 + t_2)/2$ = 6 (min/25 mm)

Result of Test : T = 6

Comments:

"PASSED" IN ACCORDANCE WITH NSAI S.R.6: 1991 BORD NA MONA RECCOMENDED A 3 STAGE TREATMENT SYSTEM (See TO APPENDIX C).

4.0 CONCLUSION:

(Integrate the information from the desk study and on-site assessment (i.e. visual assessment, trial hole and percolation tests) above and conclude the type of system that is appropriate. This information is also used to choose the optimum final disposal route of the treated wastewater).

Suitable for (delete as appropriate):

(a) septic tank and soil percolation system

(b) septic tank and intermittent filter system and polishing unit; or septic tank and constructed wetlands and polishing unit

(c) ~~mechanical aeration system and polishing unit~~

and **SUITABLE** for discharge to ~~surface water~~/groundwater (delete as appropriate)

5.0 RECOMMENDATION:

Propose to install: 3 STAGE TREATMENT SYSTEM (See APPENDIX C)

and discharge to ~~surface water~~/groundwater (delete as appropriate)

Signed: [signature] Address C/O JOHN BARNCATT & ASSOC. UNIT 7, DUNDRUM BUSINESS PK., WINDY ARBOUR, D14

Qualifications B.ENG. Date of Report: 17-06-04

Phone: 01-2964667 Fax: 01-296 4676 E-mail: jshields@ecsa.ie

6.0 VERIFICATION (by Local Authority):

Site visit	☐	Date:
Inspection of Trial Hole	☐	Date:
Inspection of Percolation Test Holes	☐	Date:

Comments

SIGNED: Date:

APPENDIX A: SITE CHARACTERISATION FORM

1.0 GENERAL DETAILS (From planning application)

PLANNING APPLICATION Ref. no.:	KILDARE CO. CO. PLAN REF. 2754/03
NAME & ADDRESS OF APPLICANT:	KILSARAN CONCRETE LTD.
	PIERCETOWN, DONBOYNE, CO. MEATH
SITE LOCATION AND TOWNLAND:	KILRATHMURRY
TELEPHONE NO: 01 8251311	**FAX NO:** 8251782 **E-MAIL:** FERGUS.CALLAGHER@KILSARAN.IE
MAXIMUM NO. OF RESIDENTS: NO PEOPLE USING FACILITY ON INTERMITTENT BASIS	**NO. OF DOUBLE BEDROOMS:** N/A **NO. OF SINGLE BEDROOMS:** N/A
PROPOSED CAPACITY OF SEPTIC TANK (litres) (if applicable): 4 m^3	**NUMBER OF CHAMBERS:** 2

PROPOSED WATER SUPPLY: (tick as appropriate)	mains	private well/borehole	group well/borehole
		✓	

2.0 DESK STUDY PERCOLATION AREA 2. QUARRY/PIT AREA

Soil type: MINERAL SOIL	**Bedrock type:** LIMESTONE
Subsoil type: GLACIO FLUVIAL	**Aquifer type:** (Lg) LOCALLY IMPORTANT SAND/GRAVEL AQUIFER
Vulnerability class: HIGH	**Groundwater protection response:** ACCEPTABLE SUBJECT TO NORMAL GOOD PRACTICES

Presence of significant sites (archaeological, natural and historical):

Zoning in county development plan: PLAINLANDS: (C) NORTH WEST KILDARE

Past experience in the area:

N/A

Comments:

(Integrate the information above in order to comment on: the potential suitability of the site, potential targets at risk, and/or any potential site restrictions).

"ACCEPTABLE SUBJECT TO NORMAL GOOD PRACTICE" NO POTENTIAL TARGETS AT RISK AND/OR POTENTIAL SITE RESTRICTIONS IDENTIFIED.

Sketch of site showing measurement to Trial Hole location and Percolation Test Hole locations, wells and direction of groundwater flow, proposed house (incl. distances from boundaries), adjacent houses, watercourses, significant sites and other features. North point should always be included.

[A copy of the site layout drawing should be used if available]

SEE FIGURE 303

3.0 ON-SITE ASSESSMENT

3.1 Visual Assessment

TOPOGRAPHY: HILLY **LANDSCAPE:** AGRICULTURAL **GEOLOGY:** LIMESTONE BEDROCK QUATERNARY SAND + GRAVEL	**SLOPE:** STEEP (>1:5) SHALLOW (1:5-1:20) RELATIVELY FLAT (<1:20)

SURFACE FEATURES:

OUTCROPS NONE

HOUSES NONE

DITCHES* NONE

WELLS* NONE

SPRINGS NONE

KARST FEATURES NONE

ROADS - INTERNAL SITE HAUL ROADS

WATERCOURSE* NONE

LAKES/SURFACE WATER PONDING/ BEACHES/SHELLFISH AREAS/WETLANDS NONE

SITE BOUNDARIES SEE FIGURE 302

EXISTING LAND USE AGRICULTURAL / EXISTING QUARRY DEVELOPMENT.

* note water level

LOCAL DRAINAGE: SUBSURFACE TO SOUTH

TYPE OF VEGETATION: PASTORAL

GROUND CONDITION: GOOD

COMMENTS:

(Integrate the information above in order to comment on: the potential suitability of the site, potential targets at risk, the suitability of the site to treat the wastewater and the location of the proposed system within the site).

THERE ARE NO TARGETS AT RISK FROM THE PERCOLATION AREA AT THIS LOCATION.

3.2 Trial Hole

Hole should be approximately 1m x 0.75m in plan and a minimum of 2.1 m deep

Depth of Trial Hole (m):	2.9	**Date and time of Excavation:** 26-05-04 12:30	**Date and time of Examination:** 26-05-04 14:00

Depth from ground surface to bedrock (m): Na.

Depth from ground surface to water table (m): Na.

Soil type: MINERAL SOIL **Subsoil type:** GLACIOFLUVIAL SAND and GRAVEL

	Additional Soil/Subsoil Information				
	Texture	**Structure**	**Bulk density**	**Colour***	**Preferential flowpaths**
0.1 m	TOPSOIL	SILT with some gravel	LOW	Light Brown	NONE
0.2 m					
0.3 m					
0.4 m	Slightly SILT with occasional gravel	sandy	MEDIUM	Dark Brown	NONE
0.5 m					
0.6 m					
0.7 m					
0.8 m					
0.9 m					
1.0 m					
1.1 m					
1.2 m					
1.3 m					
1.4 m					
1.5 m					
1.6 m					
1.7 m	SAND		MEDIUM	BROWN	NONE
1.8 m					
1.9 m					
2.0 m					
2.1 m					
2.2 m					
2.3 m					
2.4 m					
2.5 m					

Other information (e.g. depth of water ingress)

NO WATER INGRESS

NO SIGNS MOTTELING IN SUBSOIL

* All signs of mottling should be recorded

3.3 Percolation Test

Type of test: T-Test ☑ or P-Test ☐

Percolation Test Hole	1	2
Depth from ground surface to top of hole (mm) (A)	100	
Depth from ground surface to base of hole (mm) (B)	500	
Depth of hole (mm) [B - A]	400	
Dimensions of hole [length x breadth (mm)]	420 x 310	

Each hole must be pre-soaked twice before the test is carried out (from 10.00 am to 5.00 pm and from 5.00 pm to next morning)

Date of test:	28-05-04	
Date pre-soaking started:	26-05-04	
Time filled to 400 mm	00:00	
Time water level at 300 mm	37:38	

Percolation Test Hole No.	1			2		
Fill no.	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)
1	37:38	1:51:37	74			
2	00:00	1:18:20	78			
3	00:00	1:28:40	88			
Average Δt			80	Average Δt		

Average Δt/4 = [Hole No.1] 20 (t_1) Average Δt/4 = [Hole No.2] _____ (t_2)

T value = $(t_1 + t_2)/2$ = 20 (min/25 mm)

Result of Test : T = 20

Comments: ONLY ONE PERCOLATION TEST CONDUCTED. SECOND LOCATION CURRENTLY BENEATH STOCKPILE. "PASSED" IN ACCORDANCE WITH NSAI S.R.6:1991 BOARD NA MONA RECOMMEND A 3 STAGE TREATMENT SYSTEM (refer to Appendix C).

4.0 CONCLUSION:

(Integrate the information from the desk study and on-site assessment (i.e. visual assessment, trial hole and percolation tests) above and conclude the type of system that is appropriate. This information is also used to choose the optimum final disposal route of the treated wastewater).

Suitable for (delete as appropriate):

(a) septic tank and soil percolation system

(b) septic tank and intermittent filter system and polishing unit; or septic tank and constructed wetlands and polishing unit

(c) ~~mechanical aeration system and polishing unit~~

and **SUITABLE** for discharge to ~~surface water~~/groundwater (delete as appropriate)

5.0 RECOMMENDATION:

Propose to install:. 3 . . STAGE . TREATMENT . . SYSTEM. (See . APPENDIX . E) . . . . .

and discharge to ~~surface water~~/groundwater (delete as appropriate)

Signed: . . . . . Address C/O JOHN BARNETT & ASSOC, UNIT 7 DUNDRUM BUSINESS PK 1, WINDY ARBOUR DUBLIN 14

Qualifications . . B.ENG . . . . . Date of Report: . . . 17-06-04 . . . . . .

Phone: 01-296467 . . . Fax:. 01-296476 . . . . . E-mail: jshells@eircom.ie

6.0 VERIFICATION (by Local Authority):

Site visit	☐	Date:
Inspection of Trial Hole	☐	Date:
Inspection of Percolation Test Holes	☐	Date:

Comments

SIGNED: Date:

APPENDIX C

Bord Na Mona Site Specific Report & Details of Treatment System proposed

BORD NA MÓNA

BORD NA MÓNA ENVIRONMENTAL LIMITED

Mr Fergus Gallagher
Kilsaran Concrete Ltd
Piercetown
Dunboyne
Co Meath

8th June 2004

Re; Quotation No 34098

Dear Customer

Thank you for your enquiry regarding the Bord na Mona Treatment system. Enclosed please find the following.

1. Site specific report
2. Filter System Quotation, Terms & Conditions
3. System Inspection Agreement

Yours sincerely

Conor Dolan
MANAGER
Domestic Wastewater Treatment

MAIN STREET, NEWBRIDGE, CO. KILDARE, IRELAND.
TELEPHONE: (045) 431201. INT: +353-45-431201. FAX: (045) 432312. INT: +353-45-432312.

REGISTERED OFFICE: MAIN STREET, NEWBRIDGE, CO. KILDARE.
REGISTERED IN IRELAND NUMBER: 303313

Re; Proposed Tertiary treatment system at Kilrathmurry, Co Meath for Kilsaran Concrete Ltd.

Based on the site information you supplied, I would make the following recommendations:

It is intended to provide a three stage treatment system as follows;

- Primary treatment within a 4m³ septic tank.
- Secondary treatment through a two modular Puraflo wastewater treatment system.
- Disposal through a percolation area, constructed as per EPA recommendations.

Based on the expected hydraulic loadings generated from the Weight bridge office at Kilsaran Quarry, Kilrathmurry, Co Kildare, it is estimated that a total of 4 people will be using the facilities intermittently during normal working hours. Therefore we have made the following assumptions, based on EPA recommendations that the development will generate a total hydraulic loading of 30litres\ m³\day per person equating to a total hydraulic load 0.12m³/ day from the weightbridge office. As a safety measure I recommend we install a one modular Puraflo treatment system, to act as a secondary treatment unit.. The maximum recommendation in section 3.2 of our Irish Agrément certificate 99\0060 is a hydraulic loading of 160lt/m²/d. The additional surface area can act as a safety net in periods of greater hydraulic loading. Given the intermittent usage from the proposed development, peat filtration is ideal in these circumstances. The one modular Puraflo shall be installed on the above site using the existing subsoil which is sufficient to act as tertiary treatment.

Criteria for disposal of treated effluent given in section 4.11.1.1, option 1 of the EPA`s wastewater treatment manual "Treatment systems for single houses" is a application rate of 20l/m².d, where a "T" value of "T"6 was recorded on this site. This in situ topsoil can be used to construct a polishing filter on site. A minimum area of 6m² will be required, i.e. (4 p.e x 30 l \person\day = 0.12m³/ 0.02 = 6m²).
The installation of the Puraflo wastewater treatment system will be as per Fig 9 of our Irish Agrément certificate 99\0060.

The level of treatment is attained prior to the effluent weeping into the prepared area. The level of treatment attained is as stated in the table below.

PARAMETER	INFLUENT	EFFLUENT	% REDUCTION
B.O.D. (mg/l)	**150**	**Less than 10**	**96 +**
T.S.S. (mg/l)	**100**	**Less than 10**	**95 +**
NH_3-N (mg/l)	**47**	**Less than 5**	**90 +**
Tot. Coliforms*	**2.8×10^6**	**3.3×10^2**	**99.9 +**
E. coli*	**1.1×10^6**	**1.8×10^2**	**99.9 +**
Pathogenic Bacteria**	**Present**	**Absent**	**-**

* CFU's per 100ml
** Including *Salmonella*, *Staphylococcus* and *Shigella* species, *Pseudomonas aeruginosa* and Sulphide reducing *Clostridia*.
This significantly reduces the risk to public health and the environment.

As per EPA , GSI and D.E.L.G recommendations, the site itself is noted as being within the " high acquifer vulnerability section ". The appropriate response to this level of vulnerability requires the following :

" Acceptable subject to normal good practices .Where domestic water supplies are located nearby , particular attention should be given to the depth of subsoil over bedrock such that the minimum depth requires (EPA 2000) are met and that the likelihood of microbial pollution is minimized"

Research studies from Ireland and USA where up to 99.9% reduction of faecal coliforms are consistently achieved, prove that Puraflo ensures that almost total elimination from treated wastewater of faecal coliforms and pathogenic organisms. As a result, the Puraflo is now recognised by most Local Authorities as the only system meeting strict requirements for the removal of pathogenic organisms for use in areas where the groundwater is at risk.

I have also enclosed a copy of our System Inspection Agreement which will ensure that a 15 BOD/15 SS standard is maintained from the treatment system.

I am satisfied that the treatment and disposal method being utilised will work satisfactorily on this site. However entering into a maintenance contract is important in ensuring the treatment system is effective.

If you require any additional clarification or assistance with the above details please do not hesitate to contact me.

Yours sincerely

Conor Dolan
MANAGER
Domestic Wastewater Treatment Systems

BORD NA MÓNA

BORD NA MÓNA ENVIRONMENTAL LIMITED

Mr Fergus Gallagher
Kilsaran Concrete Ltd
Piercetown
Dunboyne
Co Meath

8th June 2004

Re; Quotation No 34097

Dear Customer

Thank you for your enquiry regarding the Bord na Mona Tertiary Treatment system. Enclosed please find the following.

1. Site specific report
2. Filter System Quotation, Terms & Conditions
3. System Inspection Agreement

Yours sincerely

Conor Dolan
MANAGER
Domestic Wastewater Treatment

MAIN STREET, NEWBRIDGE, CO. KILDARE, IRELAND.
TELEPHONE: (045) 431201. INT: +353-45-431201. FAX: (045) 432312. INT: +353-45-432312.

REGISTERED OFFICE: MAIN STREET, NEWBRIDGE, CO. KILDARE.
REGISTERED IN IRELAND NUMBER: 303313

Re; Proposed Tertiary treatment system at Kilrathmurry, Co Meath for Kilsaran Concrete Ltd.

Based on the site information you supplied, I would make the following recommendations:

It is intended to provide a three stage treatment system as follows;

- Primary treatment within a 4m³ septic tank.
- Secondary treatment through a two modular Puraflo wastewater treatment system.
- Disposal through a percolation area, constructed as per EPA recommendations.

Based on the expected hydraulic loadings generated from the Workshop and the Administration building at Kilsaran Quarry, Kilrathnurry, Co.Kildare, it is noted that up to a maximum of approximately 40 people, shall be using the facilities intermittently during normal working hours . We have therefore made the following assumptions, based on EPA recommendations that the development will generate a total hydraulic loading of 30litres\ m³\day per person , giving a total hydraulic load 1.2m³/ day from the weight-bridge office. As a safety measure I recommend we use a two modular Puraflo, to act as secondary wastewater treatment unit. The maximum recommendation in section 3.2 of our Irish Agrément certificate 99\0060 is at a hydraulic loading of 160lt/m²/d. The additional surface area can act as a safety net in periods of greater hydraulic loading. Given the intermittent usage from the proposed development, peat filtration is ideal in these circumstances.

A 2 modular Puraflo treatment system shall be installed on the above site. The existing subsoil is sufficient to act as a polishing filter. Criteria for the disposal of treated effluent given in section 4.11.1.1, option 1 of the EPA`s wastewater treatment manual "Treatment systems for single houses" is at an application rate of 50 l/m².d, where a "T" value of "T"20 was recorded on this site. This in situ topsoil can be used to construct a polishing filter on site. A minimum area of 60m² will be required, i.e. (40 p.e x 30 l \person\day = 1200m³/ 0.02 = 60m²). The installation of the Puraflo wastewater treatment system will be as per Fig 9 of our Irish Agrément certificate 99\0060.

The level of treatment is attained prior to the effluent weeping into the prepared area. The level of treatment attained is as stated in the table below.

PARAMETER	INFLUENT	EFFLUENT	% REDUCTION
B.O.D. (mg/l)	**150**	**Less than 10**	**96 +**
T.S.S. (mg/l)	**100**	**Less than 10**	**95 +**
NH_3-N (mg/l)	**47**	**Less than 5**	**90 +**
Tot. Coliforms*	**2.8×10^6**	**3.3×10^2**	**99.9 +**
E. coli*	**1.1×10^6**	**1.8×10^2**	**99.9 +**
Pathogenic Bacteria**	**Present**	**Absent**	**-**

* CFU's per 100ml

** Including *Salmonella*, *Staphylococcus* and *Shigella* species, *Pseudomonas aeruginosa* and Sulphide reducing *Clostridia*.

This significantly reduces the risk to public health and the environment.

As per EPA , GSI and D.E.L.G recommendations, the site itself is noted as being within the " high acquifer vulnerability section ". The appropriate response to this level of vulnerability requires the following :

" Acceptable subject to normal good practices .Where domestic water supplies are located nearby , particular attention should be given to the depth of subsoil over bedrock such that the minimum depth requires (EPA 2000) are met and that the likelihood of microbial pollution is minimized"

Research studies from Ireland and USA where up to 99.9% reduction of faecal coliforms are consistently achieved, prove that Puraflo ensures that almost total elimination from treated wastewater of faecal coliforms and pathogenic organisms. As a result, the Puraflo is now recognised by most Local Authorities as the only system meeting strict requirements for the removal of pathogenic organisms for use in areas where the groundwater is at risk.

I have also enclosed a copy of our System Inspection Agreement which will ensure that a 15 BOD/15 SS standard is maintained from the treatment system.

I am satisfied that the treatment and disposal method being utilised will work satisfactorily on this site. However entering into a maintenance contract is important in ensuring the treatment system is effective.

If you require any additional clarification or assistance with the above details please do not hesitate to contact me.

Yours sincerely

Conor Dolan
MANAGER
Domestic Wastewater Treatment Systems

APPENDIX D

Copy John Barnett & Associates Ltd. Professional Indemnity

MARSH

Marsh Ireland Ltd.
Risk & Insurance Services
10/11 South Leinster Street
Dublin 2, Ireland
+353 1 6182746 Fax +353 1 6194660

CERTIFICATE OF PROFESSIONAL INDEMNITY INSURANCE

We, the undersigned Brokers, hereby certify that the following described Insurance is in force at this date:

NAME OF INSURED	:	John Barnett & Associates Ltd
TYPE OF INSURANCE	:	Professional Indemnity
INSURERS	:	St Paul Ireland Insurance
PERIOD	:	1st of January 2004 – 31st of December 2004
LIMIT OF INDEMNITY	:	€1,300,000 Any One Claim
EXCESS	:	€15,000 each and every claim
POLICY NO.	:	IC PRO 3438953

We hereby certify that, subject to its terms and conditions, the above numbered policy satisfies the requirements of the Society of Chartered Surveyors in Ireland in respect of professional indemnity cover for Chartered Surveyors.

Date: 3/2/2004

By: .....
Andy Phelan
For Marsh Ireland Limited

Appendix 7-C
Waste Water Treatment Service Record (Annua Cert)

ANUA
GAFFNEY ENVIRONMENTAL

Puraflo (Single House) Wastewater Treatment System

Commissioning Report _____ Service Inspection Report X

RECEIVED: 02/10/2023

Customer Name: Paul Mc Donagh	Job Number:	Y402	Report Date:	19-1-2022	
Site Address: Office - Kilsaran	Next Service Due:	Jan 2023			
	Number of Modules:	1			
	Gravity Outlet:	X	Pumped Outlet:		
Phone:					
Email:					

SEPTIC TANK:	Precast Concrete	X	Block Walls		Fibreglass		Other (Please Specify)	
T-Pieces Fitted	Yes X	No	Baffle Wall	Yes X	No		Septic Tank Needs Desludging	Yes No X
Outlet Filter Installed	Yes X	No	Outside Filter Accessible	Yes X	No		Outlet Filter Needs Cleaning	Yes No X
Access Manholes Secure	Yes X	No	Comments:					

PUMP/SUMP(to modules)	Type of Pump	R75	Pump Inspected & Operational	Yes X	No
Alarm Float Inspected & Operational	Yes X	No	Access Manhole Covers Secure	Yes X	No
OUTLET PUMP/SUMP	Type of Pump		Pump Inspected & Operational	Yes	No
Alarm Float Inspected & Operational	Yes	No	Access Manhole Covers Secure	Yes	No

ELECTRICS					Control Panel Connected to Permanent Electricity Supply	Yes X	No
Control Panel Enclosure	Indoor		Outdoor Mini Pillar	X	Alarm Light Operational	Yes X	No
Alarm Signal	Visible	X	Audible		Trip Switches Operational	Yes X	No
Comments							

RISING MAIN - SUMP TO MODULES		Length of Rising Main Used (m):			
1 1/2" N.G. Hydradare	X	2" N.G. Hydradare		Other (Please Specify)	

RISING MAIN - PUMP TO PERCOLATION AREA (Where Applicable)		Length of Rising Main Used (m):			
1 1/2" N.G. Hydradare		2" N.G. Hydradare		Other (Please Specify)	

MODULES LEVEL	Yes X	No	Condition of Fibre:	fair	
Base of Module Relative to Finished Ground Level (mm)				Sample Chamber Fitted	Yes X No
Are Modules Free Draining	Yes X	No	Comments:		

General comments - where applicable please include details and price charged for replacement parts, details of any remedial work required

fixed pump.

Service/Commissioning Satisfactory	Yes No	Date 17-01-2022
Service/commissioning carried out by: (print name) DECLAN GAFFNEY	Signature:	Customer Signature:

Appendix 7-D
Annagh Stream Baseline Surface Water Quality

Parameter Name	Units	Clonard SW - ANNAGH07 (Sampled on 24/11/2021)	EQS for Inland Surface Waters (Rivers) *
Cyanide (Free)	ug/L	<5	10
Solids (Total Suspended)	mg/L	4	
Coliforms (Total)	cfu/100ml	540	
Sulphide	mg/L as S2-	<0.010	
Sulphate	mg/L as SO4	35.1	
Coliforms (Faecal)	cfu/100ml	320	
Dissolved oxygen (mg/l)	mg/L	10.6	
Iron (Dissolved)	ug/L	130.1	
Copper (Dissolved)	ug/L	1.6	5
Barium (Dissolved)	ug/L	58	
Cadmium (Dissolved)	ug/L	<0.5	0.45 - 1.5
Lead (Dissolved)	ug/L	<0.2	
Sodium (Dissolved)	mg/L	39.0	
Zinc (Dissolved)	ug/L	11.4	50
Antimony (Dissolved)	ug/L	<4	
Arsenic (Dissolved)	ug/L	0.8	25
Chromium (Dissolved)	ug/L	0.7	3.4
Nickel (Dissolved)	ug/L	6.2	
Vanadium (Dissolved)	ug/L	<3	
Selenium (Dissolved)	ug/L	<3	
Mercury (Dissolved)	ug/L	<0.1	0.07
Nitrate as NO3	mg/L as NO3	14.79	
Nitrite as NO2	mg/L as NO2	0.076	
Boron (Dissolved)	ug/L	29	
Calcium (Dissolved)	mg/L	148.8	
BOD (Surface Water)	mg/L	0	Good status ≤1.5 (mean) or ≤2.6 (95%ile)
COD (Surface Water)	mg/L	38	
pH (Surface Water)	pH Units	7.82	6.0 to 9.0
Chloride (Surface Water)	mg/L	30.1	
Ammonia (Surface Water)	mg/L as N	<0.01	
Aluminium (Surface Water)	ug/L	39	
Manganese (Surface Water)	ug/L	35	
Nitrite (Surface Water)	mg/L as N	0.023	

Parameter Name	Units	Clonard SW - ANNAGH07 (Sampled on 24/11/2021)	EQS for Inland Surface Waters (Rivers)*
Nitrogen (Total Oxidised) (Surface Water)	mg/L as N	3.36	
Phosphate (Ortho) Surface Water	mg/L as P	0.03	
Fluoride (Surface Water)	mg/L	0.22	0.5
Nitrate (Surface Water)	mg/L as N	3.34	
Magnesium (Surface water)	mg/L	7.4	
Potassium (Dissolved)	mg/L	2.8	
Conductivity (Surface Water at 20C)	µscm -1@20C	657.0	
TPH CWG (Total Aliphatic and Aromatic)*	ug/L	<40	
Ammonia as NH3 (Surface Water)	mg/L as NH3	<0.01	
Ammonium as NH4 (Surface Water)	mg/L as NH4	<0.01	Good status ≤0.065 (mean) or ≤0.140 (95%ile)
Phosphorus (Total) Dissolved	mg/L as P	0.047	Good status ≤0.035 (mean) or ≤0.075 (95%ile)
* Environmental Quality Standards - SI No. 272 of 2009 and SI No. 77 of 2019			

Appendix 7-E
WFD Compliance Assessment

HYDRO ENVIRONMENTAL SERVICES

22 Lower Main St
Dungarvan
Co.Waterford
Ireland

tel: +353 (0)58 44122
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web: www.hydroenvironmental.ie

WATER FRAMEWORK DIRECTIVE ASSESSMENT
CLONARD QUARRY EXTENSION, CO. KILDARE

FINAL REPORT

Prepared for:

KILSARAN CONCRETE

Prepared by:

HYDRO-ENVIRONMENTAL SERVICES

DOCUMENT INFORMATION

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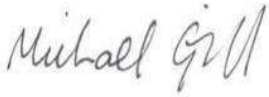
Author:	MICHAEL GILL CONOR MCGETTIGAN
Signed:	 _____ Michael Gill B.A., B.A.I., M.Sc., MIEI Managing Director – Hydro-Environmental Services

Disclaimer:
This report has been prepared by HES with all reasonable skill, care and diligence within the terms of the contract with the client, incorporating our terms and conditions and taking account of the resources devoted to it by agreement with the client. We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above. This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies upon the report at their own risk.

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FIGURES (IN TEXT)

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1. INTRODUCTION

1.1 BACKGROUND

Hydro-Environmental Services (HES) were requested by SLR Consulting, on behalf of Kilsaran Concrete, to complete a Water Framework Directive (WFD) Compliance Assessment in relation to the proposed Clonard Quarry Extension (the 'Proposed Development Site'). The Proposed Development Site is located ~1.2km north of the village of Clogharinka, Co. Kildare and ~6.2km northeast of Edenderry Town, Co. Offaly.

The purpose of this WFD assessment is to determine if any specific components or activities associated with the Proposed Development will compromise WFD objectives, or cause a deterioration in the status of any surface water or groundwater body and/or jeopardise the attainment of good surface water or groundwater status. This assessment will determine the water bodies with the potential to be impacted, describe the proposed mitigation measures, and determine if the project is in compliance with the objectives of the WFD.

This WFD Assessment is intended to supplement the EIAR submitted as part of the planning application for the Proposed Development.

1.2 STATEMENT OF AUTHORITY

Hydro-Environmental Services (HES) are a specialist geological, hydrological, hydrogeological, and environmental practice that delivers a range of water and environmental management consultancy services to the private and public sectors across Ireland and Northern Ireland. HES was established in 2005, and our office is located in Dungarvan, County Waterford. We routinely complete impact assessments for hydrology and hydrogeology for a large variety of project types including wind farms.

This WFD assessment was prepared by Michael Gill and Conor McGettigan.

Michael Gill (P. Geo., B.A.I., MSc, Dip. Geol., MIEI) is an Environmental Engineer with over 22 years' environmental consultancy experience in Ireland. 22 years' environmental consultancy experience in Ireland. Michael has a degree in Civil and Environmental Engineering, a MSc in Engineering hydrology from TCD and a MSc in Applied Hydrogeology from Newcastle University. Michael has completed numerous (60+) hydrological and hydrogeological assessments relating to bedrock quarries and sand and gravel pits. Recent examples include Ardfert quarry in County Kerry and Middleton Quarry in County Cork.

Conor McGettigan (MSc, BSc) is an Environmental Scientist with 3 years' experience in the environmental sector in Ireland. Conor holds an MSc in Applied Environment Science and a BSc in Geology. Conor routinely completed hydrological and hydrogeological impact assessment, flood risk assessments and WFD compliance assessments for a range of proposed developments including wind farms, residential developments, industrial developments, and quarries.

1.3 WATER FRAMEWORK DIRECTIVE

The EU Water Framework Directive (2000/60/EC), as amended by Directives 2008/105/EC, 2013/39/EU and 2014/101/EU ("**WFD**"), was established to ensure the protection of the water environment. The Directive was transposed in Ireland by the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003).

The WFD requires that all member states protect and improve water quality in all waters, with the aim of achieving good status by 2027 at the latest. Any new development must ensure that this fundamental requirement of the WFD is not compromised.

The WFD is implemented through the River Basin Management Plans (RBMP) which comprises a six-yearly cycle of planning, action and review. RBMPs include identifying river basin districts, water bodies, protected areas and any pressures or risks, monitoring and setting environmental objectives. In Ireland the first RBMP covered the period from 2010 to 2015 with the second cycle plan covering the period from 2018 to 2021.

The River Basin Management Plan (2018 - 2021) objectives, which have been integrated into the design of the proposed development, include:

- Ensure full compliance with relevant EU legislation;
- Prevent deterioration and maintain a 'high' status where it already exists;
- Protect, enhance and restore all waters with aim to achieve at least good status by 2027;
- Ensure waters in protected areas meet requirements; and,
- Implement targeted actions and pilot schemes in focused sub-catchments aimed at (1) targeting water bodies close to meeting their objectives and (2) addressing more complex issues that will build knowledge for the third cycle.

Furthermore, the Department of Housing, Local Government and Heritage are currently reviewing the submissions made on the Draft River Basin Management Plan (2022 - 2027) which was out for public consultation in Q4 of 2021 and Q1 of 2022. The draft plan will be updated with a view to finalisation and publication in Q3/Q4 of 2022.

Our understanding of these objectives is that water bodies, regardless of whether they have 'Poor' or 'High' status, should be treated the same in terms of the level of protection and mitigation measures employed.

2. WATERBODY IDENTIFICATION CLASSIFICATION

2.1 INTRODUCTION

This section identifies those surface water and groundwater bodies with potential to be affected by the Proposed Development and reviews any available WFD information.

2.2 SURFACE WATERBODY IDENTIFICATION

Regionally, the Proposed Development Site is located within the Boyne surface water catchment within Hydrometric Area 7 of the Eastern River Basin District.

On a more local scale, the Proposed Development Site is located within the Boyne_SC_020 river sub-catchment and 2 no. WFD river sub-basins. The west of the Proposed Development Site is located in the Boyne_040 sub-basin with the east being mapped in the Glash_020 river sub-basin.

Within the Boyne_040 river sub-basin a small stream, referred to by the EPA as the Annagh stream, is mapped immediately to the west of the Proposed Development Site. This watercourse flows to the north before discharging into the River Boyne ~650m northwest of the Proposed Development Site.

Within the Glash_020 river sub-basin, a small stream is mapped to originate to the east of the Proposed Development Site. This watercourse flows to the northeast and discharges into the Glash River ~2.2km to the northeast. These watercourses form part of the Glash_020 WB. The Glash river flows to the northwest before it discharges into the Boyne_040 SWB ~3km north of the Proposed Development Site.

Further downstream the Boyne River continues to flow to the northeast, past the town of Trim and through the town of Navan, Co. Meath before the Boyne_180 SWB discharges into the Boyne Estuary coastal waterbody to the east of Drogheda, Co. Louth. The Boyne Estuary transitional waterbody in turn discharges into the Boyne Estuary Plume Zone coastal waterbody.

Figure A below presents a local hydrology map and identifies the SWBs downstream of the Proposed Development Site.

Table A presents the catchment area of each waterbody downstream of the Proposed Development Site. The catchment area for the waterbodies increases progressively downstream as more tributaries discharge into the River Boyne. Therefore, those waterbodies which are in close proximity to the site are more susceptible to water quality impacts as a result of activities associated with the Proposed Development. The potential for the Proposed Development to impact a waterbody decreases further downstream due to the increasing catchment area to the surface waterbody and resulting increase in flow volumes.

Table A: Catchment Area of SWBs Downstream of Proposed Development Site

WFD River Sub-Basin	Total Catchment Area (km²)
Glash_020	30.75
Boyne_040	436.4
Boyne_050	741.64
Boyne_060	947.67
Boyne_070	1,147.95
Boyne_080	1,343.76
Boyne_090	1,354.41
Boyne_100	1,471.87
Boyne_110	1,563.22
Boyne_120	1,666.65
Boyne_130	1,680.85
Boyne_140	2,397.15
Boyne_150	2,411.06
Boyne_160	2,468.03
Boyne_170	2,477.50
Boyne_180	2,524.54

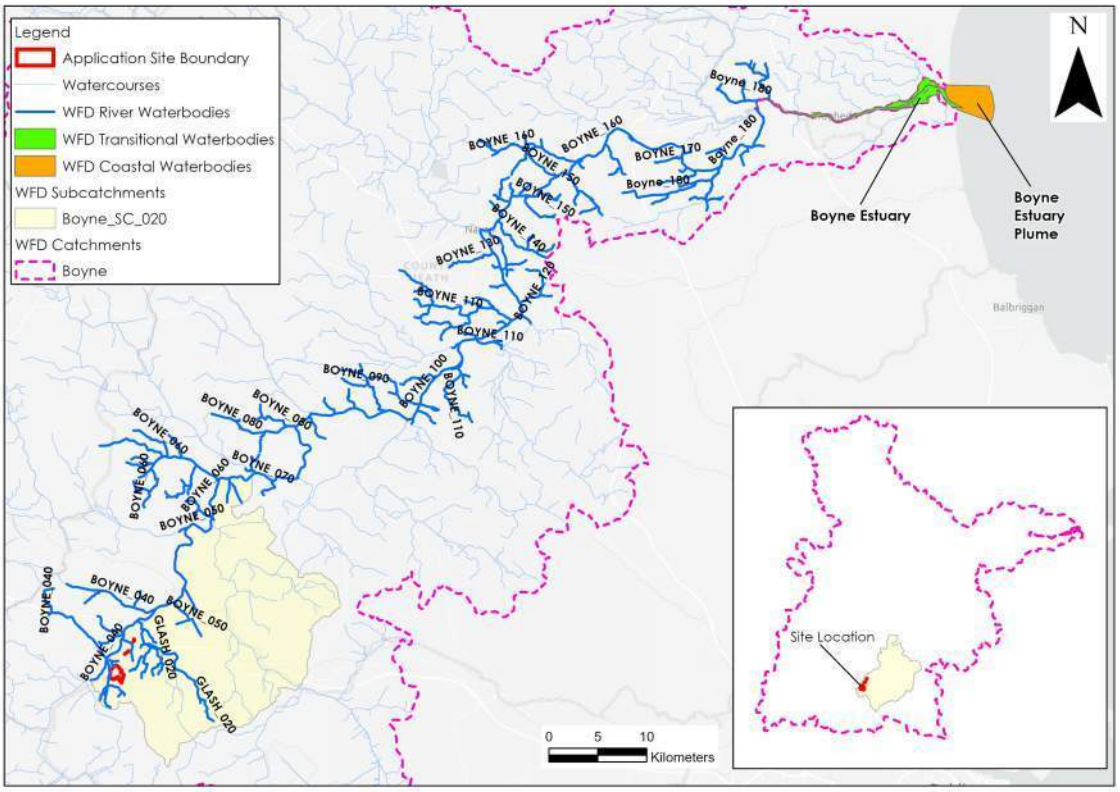

Figure A: Local Hydrology Map

2.3 SURFACE WATER BODY CLASSIFICATION

A summary of the WFD status and risk result for Surface Water Bodies (SWBs) downstream of the Proposed Development Site are shown in **Table B**. The overall status is based on the ecological, chemical and quantitative status of each SWB.

Local Groundwater Body (GWB) and Surface water Body (SWB) status information is available from (www.catchments.ie).

As described in **Section 2.2** above, the Proposed Development Site is drained by the Boyne_040 SWB in the west and the Glash_020 SWB in the east. These SWBs achieved "Moderate" status in all 3 no. WFD cycles. Further downstream, the Boyne River is predominantly of "Moderate" status with 4 no. river waterbodies (Boyne_050, _060, _170 and _180) achieving "Good" status in the latest WFD cycle (2016-2021). In terms of transitional and coastal waterbodies, the Boyne Estuary and the Boyne Estuary Plume Zone SWBs both achieved "Moderate" status.

In terms of risk status, the Glash_020 and Boyne_040 SWBs in the vicinity of the Proposed Development Site have been deemed to be "at risk" of failing to meet their respective WFD objectives. Further downstream the majority of the Boyne River is also "at risk" whilst several sections are "under review" and 3 no. SWBs (Boyne_050, _130 and _180) are "not at risk".

The 3rd Cycle Draft Boyne Catchment Report (EPA, 2021) states that agriculture is the most significant pressure in the Boyne Catchment. Agriculture has been identified as a significant pressure on 4 no. SWBs downstream of the Proposed Development Site. The closest SWB to the Proposed Development Site impacted by agriculture is the Boyne_060 SWB. The primary issues relating to agricultural activities are phosphorus loss to surface waters, organic pollution associated with run-off from farmyards and the entrainment of sediment in surface waters due to land drainage works and bank erosion.

Hydromorphological (or physical) is also listed as a significant pressure in the Boyne Catchment, impacting 5 no. SWBs downstream of the Proposed Development Site including the Boyne_040 SWB.

Meanwhile, the 3rd Cycle Draft Boyne Catchment Report (EPA, 2021) lists peat (peat drainage and extraction) as a significant pressure on both the Glash_020 and the Boyne_040 SWBs in the vicinity of the Proposed Development Site. Peat pressures are related to increased sediment loads which alter habitats, morphology and hydrology. Peat extraction activities also result in fluctuation in downstream ammonia concentrations.

The Boyne_040 SWB has also been identified as being under significant pressure from mines and quarries. The draft catchment report states that a number of old quarries and backfilled quarries have been identified as a significant pressure on this SWB and have cause morphological impacts in the river channel.

The SWB status for the 2016-2021 WFD cycle are shown on **Figure B.**

Table B: Summary WFD Information for Surface Waterbodies

SWB	Overall Status (2010-2015)	Overall Status (2013-2018)	Overall Status (2016-2021)	Risk Status 3rd Cycle	3rd Cycle WFD Pressures
Glash_020	Moderate	Moderate	Moderate	At risk	Peat
Boyne_040	Moderate	Moderate	Moderate	At risk	Hydromorphology, Mines & Quarries and Peat
Boyne_050	Good	Good	Good	Not at risk	-
Boyne_060	Moderate	Good	Good	At risk	Agriculture & Hydromorphology
Boyne_070	Good	Moderate	Moderate	At risk	Agriculture
Boyne_080	Moderate	Moderate	Moderate	At risk	Hydromorphology
Boyne_090	Moderate	Moderate	Moderate	At risk	Hydromorphology & urban run-off
Boyne_100	Moderate	Moderate	Moderate	At risk	Agriculture & Hydromorphology
Boyne_110	Unassigned	Good	Moderate	Under review	-
Boyne_120	Moderate	Good	Moderate	Under review	-
Boyne_130	Unassigned	Good	Moderate	Not at risk	-
Boyne_140	Unassigned	Moderate	Moderate	Under review	-
Boyne_150	Moderate	Moderate	Moderate	At risk	Anthropogenic & domestic wastewater
Boyne_160	Moderate	Moderate	Moderate	Under review	-
Boyne_170	Good	Good	Good	Under review	-
Boyne_180	Good	Good	Good	Not at risk	-
Boyne Estuary	Moderate	Moderate	Moderate	At risk	Agriculture & urban wastewater
Boyne Estuary Plume	Good	Moderate	Moderate	At risk	Anthropogenic & urban runoff

2.4 GROUNDWATER BODY IDENTIFICATION

According to GSI (www.gsi.ie), the Proposed Development Site is underlain by the Dinantian Upper Impure Limestones of the Lucan Formation in the north. Further south the Proposed Development Site is underlain by the Dinantian Pure Bedded Limestones of the Edenderry Oolite Member. These bedrock geology formations are classified as being Locally Important Aquifers – Bedrock which is Generally Moderately Productive. Meanwhile, a small area in the southeast is underlain by the Dinantian Pure Unbedded Limestones of the Waulsortian Limestone Formation. The Waulsortian Limestones are classified by the GSI as being a Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones.

In the area of the Proposed Development Site, the bedrock aquifers are overlain by sand and gravel deposits which are classified as a Locally Important Gravel Aquifer. We note that within the proposed development site that much of the sand and gravel deposits have already been removed and only small areas of in-situ subsoils remain.

In terms of Groundwater Bodies (GWBs), the Proposed Development Site is underlain by the Kilrathmurry Gravels GWB and the Trim GWB.

The GWB status for the 2016-2021 WFD cycle are shown on **Figure B.**

2.5 GROUNDWATER BODY CLASSIFICATION

GWBs are assigned a status based on the assessment of groundwater chemical and quantitative figures.

The Kilrathmurry Gravels GWB and the Trim GWB underlying the Proposed Development Site, both achieved "Good" status in all 3 no. WFD cycles. The risk status for the Kilrathmurry Gravels GWB is currently under review, while the Trim GWB has been deemed to be "at risk" of failing to meet its WFD objectives. This GWB is under significant pressure from domestic wastewater and anthropogenic activities.

Table C: Summary WFD Information for Groundwater Bodies

GWB	Overall Status 2010-2015	Overall Status 2013-2018	Overall Status 2016-2021	3rd Cycle Risk Status	Pressures
Kilrathmurry Gravels	Good	Good	Good	Not at risk	-
Trim	Good	Good	Good	At risk	Domestic Wastewater & an unknown anthropogenic pressure

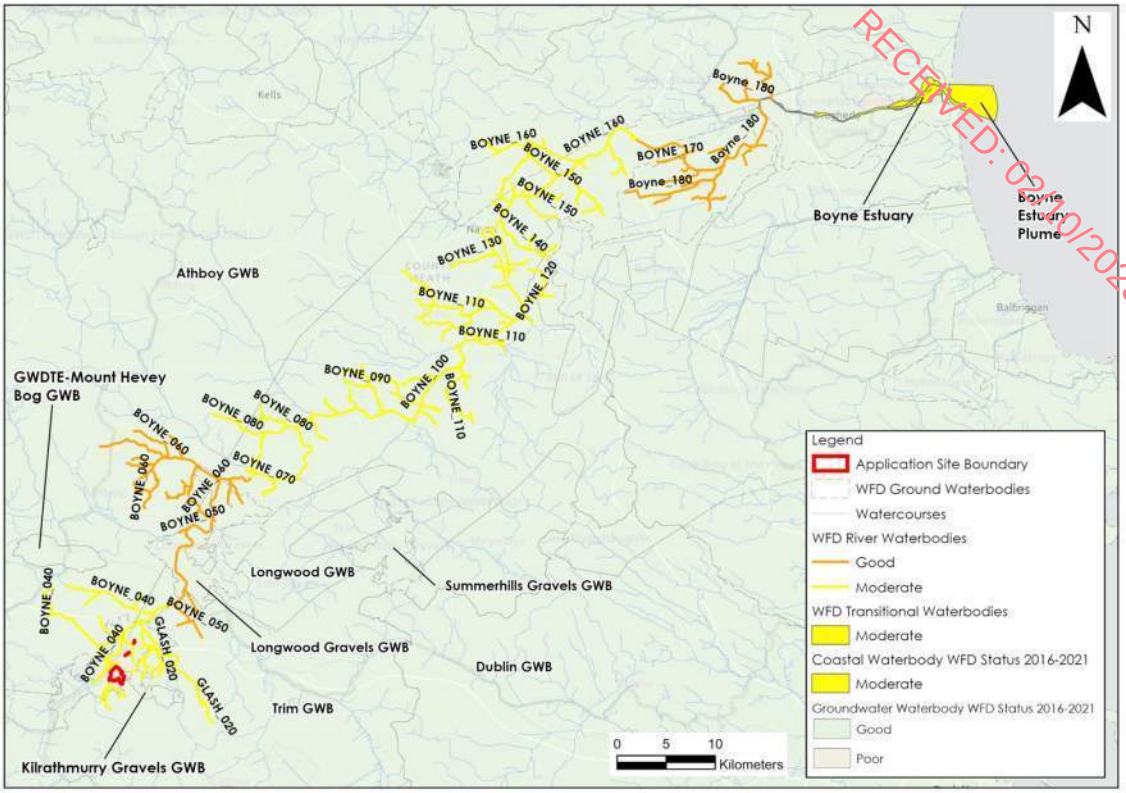

Figure B: WFD Groundwater and Surface Waterbody Status (2016-2021)

2.6 PROTECTED AREA IDENTIFICATION

The WFD requires that activities are also in compliance with other relevant legislation, as considered below.

The potential effect of the Proposed Development on nature conservation designations, bathing waters, nutrient sensitive areas (NSAs), shellfish areas and drinking water protected area's (DWPAs) are also included as part of the WFD Compliance Assessment.

2.6.1 Nature Conservation Designations

Within the Republic of Ireland designated sites include Natural Heritage Areas (NHAs), Proposed Natural Heritage Areas (pNHAs), Special Areas of Conservation (SACs), candidate Special Areas of Conservation (cSAC) and Special Protection Areas (SPAs).

Ramsar sites are wetlands of international importance designated under the Ramsar Convention (adopted in 1971 and came into force in 1975), providing a framework for the conservation and wise use of wetlands and their resources.

The Proposed Development Site is not located within a Ramsar site or a designated site of national (Natural Heritage Area (NHA) / Proposed Natural Heritage Area (pNHA)) or European importance (Special Area of Conservation (SAC) / Special Protection Area (SPA).

However, several designated sites are located in the surrounding lands and/or downstream of the Proposed Development Site:

- Ballina Bog pNHA (Site Code: 000390) located ~3.7km to the east;
- The Royal Canal pNHA (Site Code: 002103) is located ~4.79km to the northeast;
- Carbury Bog NHA (Site Code: 001388) is located ~5km to the southeast;

- Mount Hevey Bog SAC/NHA (Site Code (SAC): 002342) is located ~6.1km to the northwest;
- Molerick Bog NHA (Site Code: 001582) is located ~4.85km to the north;
- River Boyne and River Blackwater SAC (Site Code: 002299) is located ~5km to the northeast and is hydrologically linked with the Proposed Development Site via the tributaries of the Boyne;
- River Boyne and River Blackwater SPA (Site Code: 004232) is located ~5km to the northeast and is hydrologically linked with the Proposed Development Site via the tributaries of the Boyne;
- Trim pNHA (Site Code: 001357) is located ~23km to the northeast and along the river Boyne;
- Boyne Woods pNHA (Site Code: 001592) is located ~38km to the northeast and along the River Boyne;
- Crewbane March pNHA (Site Code: 000553) is located ~45km to the northeast and along the River Boyne;
- Dowth Wetland pNHA (Site Code: 001861) is located ~50km to the northeast and along the River Boyne;
- Boyne River Islands pNHA (Site Code: 001862) is located ~52km to the northeast and along the River Boyne; and,
- Boyne Coast and Estuary SAC and pNHA(Site Code: 001957) is located ~56km to the northeast and along the River Boyne.

2.6.2 Bathing Waters

Bathing waters are those designated under the Bathing Water Directive (76/160/EEC) or the later revised Bathing Water Directive (2006/7/EC).

There are no designated bathing water sites located in the vicinity of the Proposed Development Site.

2.6.3 Nutrient Sensitive Areas

Nutrient Sensitive Areas (NSA) comprise Nitrate Vulnerable Zones and polluted waters designated under the Nitrates Directive (91/676/EEC) and areas designated as sensitive areas under the Urban Wastewater Treatment Directive (UWWTD)(91/271/EEC). Sensitive areas under the UWWTD are water bodies affected by eutrophication associated with elevated nitrate concentrations and act as an indication that action is required to prevent further pollution caused by nutrients.

The Boyne River NSA (IERI_EA_1994_0001) and the Boyne Estuary NSA (IE_EA_010_0100) are mapped downstream of the Proposed Development Site. The Boyne River NSA is mapped downstream of Navan, ~35km to the northeast of the Proposed Development Site. According to the 3rd Cycle Draft Boyne Catchment Report (2021, EPA) the NSA objectives are being met for the River Boyne and Boyne Estuary within the catchment.

2.6.4 Shellfish Area

The Shellfish Waters Directive (2006/113/EC) aims to protect or improve shellfish waters in order to support shellfish life and growth.

There are no Shellfish areas located in the vicinity of the Proposed Development Site.

2.6.5 Drinking Water

According to the 3rd Cycle Draft Boyne Catchment Report (EPA, 2021) there are 12 no. surface waterbodies in the catchment identified as Drinking Water Protected Areas (DWPAs).

No DWPAs are mapped by the EPA in the immediate vicinity of the Proposed Development Site. The Boyne_100, the Boyne_120 and the Boyne_180 SWBs downstream of the Proposed Development Site are recognised as DWPA's.

Meanwhile, all GWBs within the catchment are listed as DWPAs.

3. WFD SCREENING

As discussed in **Section 2**, there are a total of 8 no. surface waterbodies which are located in the vicinity and downstream of the Proposed Development Site. There are 6 no. river waterbodies, 1 no. transitional waterbody and 1 no. coastal waterbody downstream of the Proposed Development Site. In addition, 1 no. groundwater body underlies the Proposed Development Site.

3.1 SURFACE WATER BODIES

Due to the nature of the Proposed Development, *i.e.* a lateral extension of a bedrock quarry, and associated works (as described in **Section 4.1**), above the groundwater table, the potential for surface water quality effects will be minimal. During the operational phase there will be no discharge to surface waters and the bowl-shaped nature of the Proposed Development Site will eliminate the potential for direct pathways to exist between the Proposed Development and downstream SWBs. However, there is the potential for some minor surface water quality effects to arise during the construction phase while the new site entrance and access roads are being constructed. Earthworks will also be required at 3 no. locations along the haul route and within the Boyne_040 river sub-basin. Therefore, the Glash_020 and Boyne_040 SWBs are carried through into the WFD Impact Assessment. These SWBs have been screened in as the Proposed Development Site and the proposed works are located within their respective river sub-basins.

All other downstream river waterbodies (Boyne_050 to Boyne_180) have been screened out due to the nature of the Proposed Development, and the increasing volumes of water within the River Boyne further downstream (associated with the increased catchment area as outlined in **Table A**). The Proposed Development has no potential to cause a deterioration in status of these SWBs and/or jeopardise the attainment of good surface water status in the future.

In terms of transitional and coastal waterbodies, the Boyne Estuary and the Boyne Estuary Plume SWBs have been screened out due to their distal location from the Proposed Development Site, the large volumes of water within these SWBs and the saline nature of these waters. The Proposed Development has no potential to cause a deterioration in status of these SWBs and/or jeopardise the attainment of good surface water status in the future.

3.2 GROUNDWATER BODIES

The Kilrathmurry Gravels GWB and the Trim GWB are carried through to the WFD Impact Assessment due to their location directly underlying the Proposed Development Site and the nature of the Proposed Development (*i.e.* a lateral extension of a bedrock quarry).

3.3 PROTECTED AREAS

The Proposed Development Site is hydrologically connected to the **River Boyne and River Blackwater SAC/SPA** via several tributaries (Annagh and Glash) of the River Boyne which drain the local area of the Proposed Development Site. The qualifying interests of the SAC, as listed below are associated directly with the river system.

- [7230] Alkaline Fens
- [91E0] Alluvial Forests
- [1099] River Lamprey (*Lampetra fluviatilis*)
- [1106] Atlantic Salmon (*Salmo salar*)
- [1355] Otter (*Lutra lutra*)

Regarding the SPA, it is noted that the actual Special Conservation Interests of the SPA, as listed below, are not associated with watercourses:

- • A229 Kingfisher

As outlined in Section 3.1 there is no potential for surface water quality effects to extend any significant distance downstream of the Proposed Development Site. Therefore, with consideration for the construction, operational and decommissioning phases of the Proposed Development, it is considered that the River Boyne and River Blackwater SAC/SPA are not included in the WFD Impact Assessment.

Several other designated sites, listed in **Section 2.6.1**, are located further downstream along the River Boyne. These designated sites are located significant distances (>20km) from the Proposed Development Site. Therefore, there is no potential for the Proposed Development to effect any of these designated sites and so have been screened out.

Furthermore no hydrological connections exist between the Proposed Development Site and several designated sites as outlined below:

The **Royal Canal pNHA** is located approximately 4.9km northeast of the Proposed Development Site. However, there are no hydrological linkages between the site and this pNHA. Therefore, no hydrological or hydrogeological impacts will occur on this designated site as a result of the Proposed Development.

The **Ballina Bog pNHA** is located approximately 3.7km east of the Proposed Development Site. However, there are no hydrological linkages between the site and this pNHA. Therefore, no hydrological or hydrogeological impacts will occur on this designated site as a result of the Proposed Development.

Similarly no hydrological connections exist between the Proposed Development Site and **Carbury Bog NHA**, **Mount Hevey SAC/pNHA** and **Molerick Bog NHA**.

The **Boyne River NSA** downstream of the town of Trim has been screened out due to its distant location from the Proposed Development Site and the increasing volumes of water within the Boyne River. In addition, the **Boyne Estuary NSA** has been screened out due to its distant location, the large volumes of water within the surface waterbody and the saline nature of these waters. The Proposed Development has no potential to cause a deterioration in the status of these NSAs.

3.4 WFD SCREENING SUMMARY

A summary of WFD Screening discussed above is shown in **Table D**.

Table D: Screening of WFD Waterbodies and Protected Areas Downstream of Proposed Development Site

Type	WFD Classification	Waterbody Name/ID	Inclusion in Assessment	Justification
Surface Waterbodies	River	Glash_020	**Yes**	The east of the Proposed Development Site is located within the Glash_020 river sub-basin. The Glash_020 SWB includes some local watercourses which are located in close proximity to the Proposed Development Site. During the operational phase there will be no potential effects on this SWB due to the bowl-shaped nature of the site (eliminating any potential surface water pathways to downstream SWBs) and the lack of any discharge to local watercourses. However, during the construction phase there is the potential for some minor surface water quality effects to arise (associated with the removal of small areas of in-situ soils and subsoils within the proposed extraction area). Therefore, an assessment is required to consider the potential effects of the Proposed Development on this SWB.
	River	Boyne_040	**Yes**	The west of the Proposed Development Site is located within the Boyne_040 river sub-basin. The Boyne_040 SWB includes some local watercourses which are located in close proximity to the Proposed Development Site. During the operational phase there will be the potential for surface water runoff from the site access roads to enter local watercourses. However the potential for effects is limited as there is no surface water discharge from the site. During the construction phase there is the potential for some minor surface water quality effects to arise. During the construction phase some works will be completed at the site entrance and along 3 no. sections of the haul route in this sub-basin. Therefore, an assessment is required to consider the potential effects of the Proposed Development on this SWB.
	River	Boyne_050	No	The Boyne_050 SWB has been screened out due to its distal location from the Proposed Development Site and the increasing volumes of water within the River Boyne. This SWB has an upstream catchment area of ~742km^2. Therefore, the Proposed Development has no potential to impact the status of this SWB.
	River	Boyne_060	No	The Boyne_060 SWB has been screened out due to its distal location from the Proposed Development Site and the increasing volumes of water within the River Boyne. This SWB has an upstream catchment area of ~948km^2. Therefore, the Proposed Development has no potential to impact the status of this SWB.
	River	Boyne_070	No	The Boyne_070 SWB has been screened out due to its distal location from the Proposed Development Site and the increasing volumes of water within the River Boyne. This SWB has an upstream catchment area of ~1,148km^2. Therefore, the Proposed Development has no potential to impact the status of this SWB.
	River	Boyne_080	No	The Boyne_080 SWB has been screened out due to its distal location from the Proposed Development Site and the increasing volumes of water within the River Boyne. This SWB has an upstream catchment area of ~1,344km^2. Therefore, the Proposed Development has no potential to impact the status of this SWB.
	River	Boyne_090	No	The Boyne_090 SWB has been screened out due to its distal location from the Proposed Development Site and the increasing volumes of water within the River Boyne. This SWB has an

				upstream catchment area of ~1,354km^2. Therefore, the Proposed Development has no potential to impact the status of this SWB.
	River	Boyne_100	No	The Boyne_100 SWB has been screened out due to its distal location from the Proposed Development Site and the increasing volumes of water within the River Boyne. This SWB has an upstream catchment area of ~1,472km^2. Therefore, the Proposed Development has no potential to impact the status of this SWB.
	River	Boyne_110	No	The Boyne_110 SWB has been screened out due to its distal location from the Proposed Development Site and the increasing volumes of water within the River Boyne. This SWB has an upstream catchment area of ~1,563km^2. Therefore, the Proposed Development has no potential to impact the status of this SWB.
	River	Boyne_120	No	The Boyne_120 SWB has been screened out due to its distal location from the Proposed Development Site and the increasing volumes of water within the River Boyne. This SWB has an upstream catchment area of ~1,667km^2. Therefore, the Proposed Development has no potential to impact the status of this SWB.
	River	Boyne_130	No	The Boyne_130 SWB has been screened out due to its distal location from the Proposed Development Site and the increasing volumes of water within the River Boyne. This SWB has an upstream catchment area of ~1,681km^2. Therefore, the Proposed Development has no potential to impact the status of this SWB.
	River	Boyne_140	No	The Boyne_140 SWB has been screened out due to its distal location from the Proposed Development Site and the increasing volumes of water within the River Boyne. This SWB has an upstream catchment area of ~2,397km^2. Therefore, the Proposed Development has no potential to impact the status of this SWB.
	River	Boyne_150	No	The Boyne_150 SWB has been screened out due to its distal location from the Proposed Development Site and the increasing volumes of water within the River Boyne. This SWB has an upstream catchment area of ~2,411km^2. Therefore, the Proposed Development has no potential to impact the status of this SWB.
	River	Boyne_160	No	The Boyne_160 SWB has been screened out due to its distal location from the Proposed Development Site and the increasing volumes of water within the River Boyne. This SWB has an upstream catchment area of ~2,468km^2. Therefore, the Proposed Development has no potential to impact the status of this SWB.
	River	Boyne_170	No	The Boyne_170 SWB has been screened out due to its distal location from the Proposed Development Site and the increasing volumes of water within the River Boyne. This SWB has an upstream catchment area of ~2,478km^2. Therefore, the Proposed Development has no potential to impact the status of this SWB.
	River	Boyne_180	No	The Boyne_180 SWB has been screened out due to its distal location from the Proposed Development Site and the increasing volumes of water within the River Boyne. This SWB has an upstream catchment area of ~2,523km^2. Therefore, the Proposed Development has no potential to impact the status of this SWB.
	Transitional	Boyne Estuary	No	The Boyne Estuary transitional waterbody has been screened out due to its distal location from the Proposed Development Site, the large volume of water within the estuary and the saline

				nature of its water. Therefore, the Proposed Development has no potential to impact the status of this SWB.
	Coastal	Boyne Estuary Plume	No	The Boyne Estuary Plume coastal waterbody has been screened out due to its distal location from the Proposed Development Site, the large volumes of water within the surface waterbody and the saline nature of its water. Therefore, the Proposed Development has no potential to impact the status of this SWB.
Groundwater Bodies	Groundwater	Kilrathmurry Gravels	**Yes**	The Proposed Development Site is mapped to be overlain by the Kilrathmurry Gravels GWB. However, much of the subsoils have already been removed during previous phases of extraction. Given the proximity of the proposed works to this GWB and the presence of some residual sand and gravels soils at the site an assessment is required to consider the impacts of the Proposed Development on this GWB.
	Groundwater	Trim	**Yes**	The Proposed Development Site overlies the Tim GWB. Therefore, an assessment is required to consider the impacts of the Proposed Development on this GWB.
Protected Areas	Nature Conservation Designations	Ballina Bog pNHA	No	The Ballina Bog pNHA has been screened out of further assessment as there are no hydrological/hydrogeological connections between the Proposed Development Site and this pNHA. Therefore, the Proposed Development has no potential to impact this pNHA.
		Royal Canal pNHA	No	The Royal Canal pNHA has been screened out of further assessment as there are no hydrological/hydrogeological connections between the Proposed Development Site and this pNHA. Therefore, the Proposed Development has no potential to impact this pNHA.
		Carbury Bog NHA	No	The Carbury Bog NHA has been screened out of further assessment as there are no hydrological/hydrogeological connections between the Proposed Development Site and this NHA. Therefore, the Proposed Development has no potential to impact this pNHA.
		Mounty Hevey SAC/pNHA	No	The Mount Hevey SAC/pNHA has been screened out of further assessment as there are no hydrological/hydrogeological connections between the Proposed Development Site and this SAC/pNHA. Therefore, the Proposed Development has no potential to impact this pNHA.
		Molerick Bog NHA	No	The Molerick Bog NHA has been screened out of further assessment as there are no hydrological/hydrogeological connections between the Proposed Development Site and this pNHA. Therefore, the Proposed Development has no potential to impact this pNHA.
		River Boyne and River Blackwater SAC & SPA	No	The River Boyne and River Blackwater SAC and SPA has been screened out of further assessment due to the nature of the Proposed Development, the large volumes of water in the River Boyne and the lack of any significant downstream surface water quality effects downstream. Therefore, the Proposed Development has no potential to effect the River Boyne and River Blackwater SAC & SPA.
		Trim pNHA	No	The Trim pNHA has been screened out due to its distal location from the Proposed Development Site (~23km). Therefore, the Proposed Development has no potential to impact this pNHA.
		Boyne Woods pNHA	No	The Boyne Woods pNHA has been screened out due to its distal location from the Proposed Development Site (~38km). Therefore, the Proposed Development has no potential to impact this pNHA.
		Crewbane March pNHA	No	The Crewbane March pNHA has been screened out due to its distal location from the Proposed Development Site (~45km). Therefore, the Proposed Development has no potential to impact

				this pNHA.
		Dowth Wetland pNHA	No	The Dowth Wetland pNHA has been screened out due to its distal location from the Proposed Development Site (~50km). Therefore, the Proposed Development has no potential to impact this pNHA.
		Boyne River Islands pNHA	No	The Boyne River Islands pNHA has been screened out due to its distal location from the Proposed Development Site (~52km). Therefore, the Proposed Development has no potential to impact this pNHA.
		Boyne Coast and Estuary SAC & pNHA	No	The Boyne Coast and Estuary SAC and pNHA has been screened out due to its distal location from the Proposed Development Site (~56km). Therefore, the Proposed Development has no potential to impact this designated site.
	Nutrient Sensitive Areas	Boyne River NSA	No	The Boyne River NSA has been screened out due to its distal location from the Proposed Development Site (~35km) and the increasing volumes of water within the River Boyne. Therefore, the Proposed Development has no potential to impact the status of this NSA.
		Boyne Estuary NSA	No	The Boyne Estuary NSA has been screened out due to its distal location from the Proposed Development Site, the large volume of water within the estuary and the saline nature of its water. Therefore, the Proposed Development has no potential to impact the status of this NSA.
	Drinking Water Protected Areas.	Boyne_100	No	The Boyne_100 DWPA has been screened out due to its distal location from the Proposed Development Site and the increasing volumes of water within the River Boyne. This SWB has an upstream catchment area of ~1,563km^2.
		Boyne_120	No	The Boyne_120 DWPA has been screened out due to its distal location from the Proposed Development Site and the increasing volumes of water within the River Boyne. This SWB has an upstream catchment area of ~1,667km^2.
		Boyne_180	No	The Boyne_180 DWPA has been screened out due to its distal location from the Proposed Development Site and the increasing volumes of water within the River Boyne. This SWB has an upstream catchment area of ~2,523km^2.

4. WFD COMPLIANCE ASSESSMENT

4.1 PROPOSALS

The Proposed Development comprises the lateral of an existing bedrock quarry.

The lateral continuation of the existing bedrock quarry (6.2ha) will not involve the deepening of the quarry void beyond the existing permitted level (75.1mOD). The continued bedrock extraction works will be above the groundwater table and no groundwater dewatering will be required.

The existing processing methods at Clonard Quarry will be used for the proposed quarry extensions.

In addition it is proposed to import 35,000 tonnes of fine aggregate, principally sand, for use in the readymix concrete production.

The existing building and structures associated with the current operations will be used for the Proposed Development. However, the Proposed Development includes the provision of a new site entrance and the closing of the existing entrance and internal site access road realignment. A new wheelwash will also be constructed for the new site entrance.

Post extraction the site will be restored to a combination of beneficial agricultural and ecological after-uses.

There is no proposed water discharge from the Proposed Development Site during the operational phase.

A full description of the Proposed Development is provided in Chapter 2 of this EIAR.

4.2 POTENTIAL EFFECTS

4.2.1 Construction Phase (Unmitigated)

4.2.1.1 Potential Surface Water Quality Effects

Construction phase activities including removal of any remaining soil and overburden from the proposed extraction area, access road construction and internal site access road realignment will require earthworks resulting in the excavation of soil and subsoils. The main risk will be from surface water runoff from bare soil and stockpiles during construction works.

Hydrocarbons will also be used during the construction phase. Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a significant pollution risk to surface waters at all construction sites. The accumulation of small spills of fuels and lubricants during routine plant use can also be a pollution risk. Hydrocarbon has a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. It is also a nutrient supply for adapted micro-organisms, which can rapidly deplete dissolved oxygen in waters, resulting in the death of aquatic organisms.

Construction phase activities can result in the release of suspended solids and pollutants in runoff water and could result in an increase in the suspended sediment load, resulting in increased turbidity and contamination which in turn could affect the water quality and fish stocks of downstream watercourses.

However, there is no existing or proposed direct surface water connections between the Proposed Development Site and nearby surface watercourses. The only possible hydraulic

connections are via small rates of surface water runoff (~15%) and via vertical migration through the unsaturated zone in the gravel aquifer followed by lateral migration and discharge into nearby surface watercourses. The sand and gravel aquifer will filter out any suspended sediment before water is discharged to a surface watercourse. Furthermore we note that much of the sand and gravel aquifer has previously been removed from the proposed extraction area.

The potential for surface water quality effects associated with the proposed works along the haul route is minimal due to the scale of the proposed works and the lack of any watercourses or roadside drains in these areas.

The overall potential for surface water quality effects during the construction phase is low to negligible due to the local hydrogeological regime (high rates of groundwater recharge) and the short term-nature of the works.

A summary of potential status change to SWBs arising from surface water quality impacts from earthworks during the construction phase of the Proposed Development in the unmitigated scenario are outlined in **Table E.**

Table E: Surface Water Quality Effects during Construction Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Potential Status Change
Glash_020	IE_EA_07G020600	Moderate	Moderate
Boyne_040	IE_EA_07B040600	Moderate	Moderate

4.2.1.2 Potential Groundwater Quality Effects

Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a pollution risk to groundwater. The accumulation of small spills of fuels and lubricants during routine plant use can also be a pollution risk and have the potential to impact on groundwater quality in the underlying groundwater bodies. All works during the construction phase will be above the groundwater table.

A summary of potential status change to the underlying GWBs, arising from potential groundwater quality impacts during the construction phase of the Proposed Development in the unmitigated scenario are outlined in **Table F**.

Table F: Groundwater Quality Impacts during Construction Phase (Unmitigated)

GWB	WFD Code	Current Status	Assessed Potential Status Change
Kilrathmurry Gravels	IE_EA_G_044	Good	Moderate
Trim	IE_EA_G_002	Good	Moderate

4.2.2 Operational Phase (Unmitigated)

4.2.2.1 Potential Surface Water Quality Effects

During the operation phase, there will be no direct connection between the Proposed Development Site and nearby surface waters. The Proposed Development Site will be bowl shaped and all runoff will be directed into the quarry void.

However, the construction of the new site access road could potentially provide a pathway for surface water to leave the Proposed Development Site and enter the local surface water network.

Hydrocarbons will also be used on-site throughout the operation phase. Accidental spillage of petroleum hydrocarbons is a significant pollution risk to surface waters at all quarry sites.

However, due to the bowl-shaped nature of the extraction areas, no direct hydrological pathways will occur between the Proposed Development Site and downstream SWBs. During the operational phase there will be no discharge to surface watercourses. All surface water within the Proposed Development Site will either be recycled and reused on-site (wheelwash etc.) or will infiltrate to ground. The potential to affect surface water quality is through hydraulic continuity with groundwater (in the gravel aquifer).

A summary of potential status change to SWBs during the operation phase of the Proposed Development in the unmitigated scenario are outlined in **Table G**.

Table G: Potential Surface Water Quality Effects during Operational Phase (Unmitigated)

SWB	WFD Code	Current Status	Assessed Potential Status Change
Glash_020	IE_EA_07G020600	Moderate	Moderate
Boyne_040	IE_EA_07B040600	Moderate	Moderate

4.2.2.2 Potential Groundwater Quality Effects

The risks to groundwater quality are the same as those described in **Section 4.2.1.2**. All works during the operation phase of the Proposed Development will be located above the groundwater table.

No extraction below the existing permitted levels will occur. Therefore, no groundwater dewatering will be required and there is no potential for groundwater quantity effects.

There is also the potential for suspended sediment entrainment in water within the site, associated with the washing of material at the processing plant. This could potentially infiltrate into ground and effect local groundwater quality.

A summary of potential status change to the underlying GWBs, arising from groundwater quality impacts during the operation stage of the Proposed Development in the unmitigated scenario are outlined in **Table H**.

Table H: Groundwater Quality Impacts During Operational Phase (Unmitigated)

GWB	WFD Code	Current Status	Assessed Potential Status Change
Kilrathmurry Gravels	IE_EA_G_044	Good	Moderate
Trim	IE_EA_G_002	Good	Moderate

4.3 MITIGATION MEASURES

In order to mitigate against the potential negative effects on surface and groundwater quality, quantity and flow patterns, mitigation measures will be implemented during the construction and operational phases of the Proposed Development. These are outlined below.

Many of the mitigation measures proposed below are currently being utilised and effectively implemented as part of the existing operations at Clonard.

4.3.1 Construction Phase

4.3.1.1 Mitigation Measures to Protect Surface Water Quality

Due to the local hydrogeological regime, no specific mitigation measures are required to protect surface water quality. There is no direct pathway between the proposed extraction area and downstream SWBs. Surface water quality may be effected by the lateral migration of groundwater from the Proposed Development Site. Mitigation measures for the protection of groundwater quality will also ensure that there is no deterioration in surface water quality.

Due to the permeable nature of the local subsoils and the lack of surface watercourses in the vicinity of the proposed extraction area, any surface water runoff will quickly infiltrate to ground.

4.3.1.2 Mitigation Measures to Protect Groundwater Quality

In relation to suspended solids, no specific mitigation measures are required due to:

- The permeable nature of the local subsoils and the lack of surface watercourses in the vicinity of the proposed extraction area, any surface water runoff will quickly infiltrate to ground.
- The sand and gravel subsoils which will provide filtration and remove suspended sediments from groundwater.
- Furthermore, no evidence of any groundwater flowpaths was noted in the quarry floor or the exposed quarry walls.

Mitigation measures proposed to avoid the release of **hydrocarbons** at the site include:

- All plant and machinery will be serviced before being mobilised to site;
- Refuelling will be completed in a controlled manner using drip trays (bunded container trays) at all times;
- All fuels will be stored in the existing bunded fuel storage areas at the site workshop;
- Only designated trained operators will be authorised to refuel plant on site; and,
- Procedures and contingency plans will be in place to deal with emergency accidents or spills (spill kits including high absorbency mats will be available on-site).

4.3.2 Operational Phase

4.3.2.1 Mitigation Measures to Protect Surface Water Quality

During the operational phase there will be no discharge to local surface waters. The extraction areas will create a bowl-shaped topography which all surface water being contained and within the Proposed Development Site before infiltrating to ground.

Drainage from the new proposed site entrance will be routed away from the public road, ensuring that there will be no surface water discharge from the Proposed Development Site to the existing local surface water drainage network. The proposed site entrance and access road will drain to a new proposed French drain which will be located immediately to the south of the new entrance and access road (Refer to Kilsaran Planning Drawing No: KC2G). The proposed French drain will redirect the surface water runoff to a suitably sized soakaway to be located to the southeast of the proposed access road.

Therefore, the only pathway for potential contamination of surface waters is via the lateral migration of groundwater. Mitigation measures for the protection of groundwater quality are detailed below.

4.3.2.2 Mitigation Measures to Protect Groundwater Quality

Mitigation measures in relation to oils and fuels are the same as those outlined in **Section 4.3.1.2** above.

Wastewater from the staff welfare facilities will continue to be managed by means of a Bord na Mona Puaflow treatment system.

The existing water management systems at the concrete batching plant will continue to be implemented with runoff treated by a series of settlement ponds. This is a closed circuit system whereby water from the settlement ponds is recycled back into the processing operations.

No groundwater dewatering is proposed.

We note that the proposed mitigation measures for the protection of groundwater quality at the site will be the same as those currently in operation at Clonard. Groundwater quality monitoring has shown that these mitigation measures are effective in protecting local groundwater quality.

4.3.3 Decommissioning Phase

The potential impacts associated with decommissioning of the Proposed Development will be similar to those associated with construction but of a reduced magnitude, due to the reduced scale of the proposed decommissioning works in comparison to construction phase works.

During decommissioning, the Proposed Development Site will be restored to a combination of natural habitat and agricultural grassland.

No significant effects on the hydrological and hydrogeological environment will occur during the decommissioning stage of the Proposed Development.

4.3.4 Potential Effects with the Implementation of Mitigation

In all instances, the mitigation measures described in **Section 4.3** are sufficient to meet the WFD Objectives. The assessment of WFD elements for the WFD waterbodies is summarised in **Table I** below.

Table I: Summary of WFD Status for Unmitigated and Mitigated Scenarios

WFD Water Bodies	WFD Code	Current Status	Assessed Status - Unmitigated	Assessed Status with Mitigation Measures
Surface Water Bodies				
Glash_020	IE_EA_07G020600	Moderate	Moderate	Moderate
Boyne_040	IE_EA_07B040600	Moderate	Moderate	Moderate
Groundwater Bodies				
Kilrathmurry Gravels	IE_EA_G_044	Good	Moderate	Good
Trim	IE_EA_G_002	Good	Moderate	Good

5. SUMMARY AND CONCLUSION

WFD status for SWBs (Surface Water Bodies) and GWBs (Groundwater Bodies) hydraulically linked to the Proposed Development Site are defined in **Section 2** above.

The Proposed Development does not involve any abstraction of groundwater or discharge to surface watercourses. Therefore, the quantitative status (i.e., the available quantity (volume) of groundwater and surface water locally) to the receiving waters will remain unaltered during the construction and operational phase of the Proposed Development.

There is no direct discharge from the Proposed Development Site to downstream receiving waters. Due to the local hydrogeological regime, which is characterised by low rates of surface water runoff and high rates of groundwater recharge, the only potential pathway between the site and downstream watercourses is via groundwater recharge and the lateral migration of groundwater. Mitigation for the protection of groundwater during the construction, operation and decommissioning phases of the development will ensure the qualitative status of the receiving surface waters will not be altered by the Proposed Development.

Groundwater is the primary receptor and mitigation measures have been proposed to protect groundwater quality during the construction, operational and decommissioning phases of the Proposed Development. These mitigation measures are the same as those which have been implemented to date at Clonard, with groundwater quality monitoring indicating that they are effective in maintaining groundwater quality. The continued uses of these mitigation measures will ensure the qualitative status of the underlying GWBs will not be altered by the Proposed Development.

There will be no change in GWB or SWB status in the underlying GWBs or downstream SWBs resulting from the Proposed Development. There will be no change in quantitative (volume) or qualitative (chemical) status, and the underlying GWBs are protected from any potential deterioration from chemical pollution.

As such, the Proposed Development will not impact upon any surface water or groundwater body as it will not cause a deterioration of the status of the body and/or it will not jeopardise the attainment of good status.

As such, the Proposed Development:

- will not cause a deterioration in the status of all surface and groundwater bodies assessed;
- will not jeopardise the objectives to achieve 'Good' surface water/groundwater status;
- does not jeopardise the attainment of 'Good' surface water/groundwater chemical status;
- does not jeopardise the attainment of 'Good' surface water/groundwater quantity status;
- does not permanently exclude or compromise the achievement of the objectives of the WFD in other waterbodies within the same river basin district;
- is compliant with the requirements of the Water Framework Directive (2000/60/EC); and,
- is consistent with other Community Environmental Legislation including the EIA Directive (2014/52/EU), the Habitats Directive (92/43/EEC) and the Birds Directive (2009/147/EC) (Note that a full list of legislation complied with in relation to hydrology and hydrogeology is included in Section 7.22 to 7.25 of the EIAR).

* * * * * * * * * * * * *

Appendix 7-F
Stage 1 Flood Risk Assessment Report

FLOOD RISK ASSESSMENT

Kilrainy & Kilrathmurry, Co. Kildare

Prepared for:

Kilsaran Concrete Unlimited Company

SLR Ref: 501.00036.0065251
Version No: Rev0
September 2023

BASIS OF REPORT

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FIGURES

1.0 INTRODUCTION

SLR Consulting (SLR) has been appointed by Kilsaran Concrete Unlimited Company (Kilsaran) to support a planning application for the proposed development of the existing hard rock quarry and all existing associated processing, manufacturing and welfare facilities associated with the existing sand and gravel pit at the site. The application also provides for the importation of sand for use in the existing concrete batching facility on site. The planning application area consisting of the quarry and ancillary areas is hereafter referred to as the site.

This report comprises a Flood Risk Assessment (FRA) and assess the flood risks associated with the site.

Readers are also referred to Chapter 7 of the Environmental Impact Assessment Report (EIAR) that has been prepared and submitted as part of this planning application.

1.1 Project Description

A detailed description of the site is included in Chapter 2 of the EIAR.

The site application area as noted above amounts to 51.6 hectares in total, while the overall planning application area is 51.7 hectares with the inclusion of improvement works along the public road (haulage route between the site entrance and R148 regional road) at three separate locations.

1.2 Site Location and Setting

The site location and immediate surroundings are shown on **Figure FRA-1**.

The site entrance has access onto the L5002 local road and is approximately 380m southeast of the River Boyne which delineates the boundary between counties Kildare and Meath, it lies entirely within the townlands of Kilrathmurry and Kilrainy townlands in Co. Kildare. The R401 regional road connecting Edenderry (Co. Offaly) to Kinnegad (Co. Westmeath) is southwest of the site entrance, whilst the M4 motorway and R148 regional road (former N4 national route) are to the northeast.

The existing sand and gravel pit and the site entrance are located within the townland of Kilrathmurry, while the existing quarry site is located within the townland of Kilrany.

The application site is located within a generally flat to gently undulating farmed landscape, featuring a mixture of mostly pasture and some arable farmland, as well as several woodlands/mixed forests, equestrian activities and aggregate extraction developments. The field pattern is irregular, with small to medium sized fields and generally defined by mature dense hedgerow vegetation. The topography of the surrounding land typically ranges from 70 to 90m AOD and including some occasional local highpoints up to 119m AOD, with the quarry area within the application area being one of these hills. The lowest elevations of just below 70m AOD are along the River Boyne, which traverses the area in a southwest to northeast direction.

1.3 Existing Site Drainage

The site currently comprises an existing hard rock quarry and sand and gravel pit which have serviced the on-site concrete batching facility. There is no off-site discharge system in place at the site.

1.4 Nominated Hydrologists

This FRA report has been prepared by:

- *EurGeol Dr. Peter Glanville PGeo. PhD (Geomorphology) MSc (GIS) - SLR TD Hydrology.*

Peter is a Technical Director (Hydrology) with SLR and has over 20 years' experience in the area of Hydrology and Flood Risk Assessments. Peter has undertaken and prepared flood risk assessments for a wide range of projects and has also prepared Section 4 Discharge Licences for a variety of developments. He has also been involved as a hydrologist in a range of environmental monitoring projects for Environmental Baseline Studies,

exploration operations, quarry site operations and infrastructure projects – this work has typically included hydrology monitoring (flow) and water quality sampling and testing.

A site walkover was undertaken and a channel survey along the Annagh Stream between the site and the River Boyne.

2.0 FLOOD PLANNING GUIDELINES

In November 2009, the Office of Public Works (OPW) and Department of the Environment, Heritage and Local Government (DoEHLG) issued guidelines for planning authorities addressing the management of flood risk in the planning system[1] (hereinafter referred to as the 'Flood Planning Guidelines').

The flood planning guidelines introduced comprehensive mechanisms for the incorporation of flood risk identification, assessment and management into the planning process. Implementation of the guidelines will be achieved through actions at national, regional, local authority and site-specific levels, depending on the plan or development project being considered.

2.1 Planning Objectives in Relation to Flooding

The Flood Planning Guidelines require the planning system at national, regional and local level to:

- Avoid development in areas at risk of flooding by not permitting development in flood risk areas, particularly floodplains, unless where it can be fully justified, there are wider sustainability grounds for appropriate development and unless the flood risk can be managed to an acceptable level, without increasing flood risk elsewhere and, where possible, reducing flood risk overall;
- Adopt a sequential approach to flood risk management based on avoidance, reduction and then mitigation of flood risk as the overall framework for assessing the location of new development in the development planning processes; and
- Incorporate flood risk assessment into the process of making decisions on planning applications and planning appeals.

A sequential approach is adopted in the Flood Planning Guidelines in order to guide development away from areas at risk of flooding, this entails the following actions:

- **Avoid** Locate new development in lower risk flood zones;
- **Substitute** Ensure that the type of development is not particularly vulnerable to the adverse impacts of flooding;
- **Justify** Ensure that the development is considered for strategic reasons;
- **Mitigate** Ensure that flood risk is reduced to acceptable levels; and
- **Proceed** Development to proceed only where Justification Test passed, and emergency planning measures are in place.

The sequential approach identifies and defines three different flood zones (designated Zones A, B and C) in order to guide development at a particular site. The flood zones are:

Zone A *High probability of flooding. This zone defines areas with the highest risk of flooding from rivers (i.e., more than 1% probability or more than 1 in 100) and the coast (i.e., more than 0.5% probability or more than 1 in 200).*

Zone B *Moderate probability of flooding. This zone defines areas with a moderate risk of flooding from rivers (i.e., 0.1% to 1% probability or between 1 in 100 and 1 in 1000) and the coast (i.e., 0.1% to 0.5% probability or between 1 in 200 and 1 in 1000).*

[1] *The Planning System and Flood Risk Management Guidelines for Planning Authorities* (2009): Office of Public Works and the Department of the Environment, Heritage and Local Government.

Zone C *Low probability of flooding. This zone defines areas with a low risk of flooding from rivers and the coast (i.e., less than 0.1% probability or less than 1 in 1000).*

2.2 Flood Risk Management

Technical Appendix B of the Flood Planning Guidelines addresses the incorporation of flood risk management in the design of developments, and sets out practical measures, with the aid of design examples, which can be incorporated into the development design in order to reduce the risk of flooding in areas where a potential flood risk has been identified. The design examples match flood risk with appropriate land uses, while also protecting flood conveyance routes and preserving floodplain storage.

A number of core principles are outlined in the Flood Planning Guidelines regarding design for, and management of, flood risk. These follow a sequential approach to flood risk management, and involve:

- Locating development away from areas at risk of flooding, where possible;
- Substitution of less vulnerable land uses for the more vulnerable ones that are to be replaced, where the principle of development within flood risk areas has been established; and
- Identifying and protecting land required for current and future flood risk management, such as conveyance routes, flood storage areas and flood protection schemes etc. where the principle of development within flood risk areas has been established.

In the Flood Planning Guidelines, Section 3.4 of Appendix B outlines practical landscape and drainage measures which can be closely integrated to play a key role in effective flood-reduction measures if incorporated into the design of developments. Key elements which can be incorporated include:

- Creating a permeable network and hierarchy of green space providing for direct access to areas of lower flood risk;
- Planting and shaping the land surrounding individual buildings and groups of buildings to encourage drainage away from a property;
- The use of “higher risk” low-lying ground in waterside areas for recreation, amenity and environmental purposes;
- Modest land-raising of a part of the area at high risk of flooding accompanied by compensatory provision of flood storage in areas of existing lower risk of flooding having considered other natural and built heritage issues;
- Recontouring of edge of floodplain;
- Use of earth bunds to provide local flood defense;
- The use of surface runoff attenuation measures / sustainable drainage systems (SuDS) to manage run-off from rain falling on a development can be an effective means of reducing its impact reflecting natural drainage processes and removing pollutants from urban run-off at source; and
- Avoiding structures in the floodplain.

3.0 FLOOD RISK ASSESSMENT - METHODOLOGY

A methodology for the identification and assessment of flood risk is outlined in Technical Appendix A of the Flood Planning Guidelines. The aim of the FRA is to identify and quantify the risk of flooding to land, property and people and also to provide sufficient information to assess whether the site is appropriate at a specific site.

The FRA is undertaken over a number of stages with each progressing to a more detailed assessment, dependant on the outcome of each stage, until the level of detail in the FRA is appropriate to support the planning application or it has been demonstrated that flooding is not a relevant issue for the site. The stages in the assessment are typically;

- **Stage 1:** Flood Risk Identification;
- **Stage 2:** Initial Flood Risk Assessment; and
- **Stage 3:** Detailed Flood Risk Assessment (including quantitative model).

At the end of Stages 1 and 2, a decision is taken as to whether it is necessary to proceed to the next stage in the assessment process, in relation to flood risk at a site.

3.1 Flood Risk Assessment Conceptual Model

In order to assess the flood risk for a particular site, it is essential to understand what the risk is. This is undertaken using a conceptual Source-Pathway-Receptor (SPR) model, which is widely used in understanding and managing environmental risks.

In order to develop a conceptual SPR model for the purpose of risk assessment, it is necessary to understand the origin and magnitude of potential flooding (the **Source**), the mechanism or route of flooding (the **Pathway**) and the nature / scale of the site (the **Receptor**).

3.2 Data Sources

In order to assess the flood risk at a site, it is necessary to understand both the flood Source and Pathway for flooding at a site. This is completed using available desktop data for Stages 1 and 2 of the FRA. Desktop data sources for Stages 1 and 2 include:

- **The Office of Public Works** (Flood Risk Assessment Maps, flood study reports and flood hazard mapping);
- **Environmental Protection Agency** (hydrology flow / levels, catchment boundaries);
- **Ordnance Survey of Ireland** (historical mapping);
- **Geological Survey of Ireland** (soils / subsoil /karst); and
- **Site Walkover and Topographic Surveys** (site water management and topographic survey).

This report follows the methodology for a Stage 1 flood risk identification, Stage 2 initial flood risk assessment and Stage 3 detailed flood risk assessment at the site-specific level; as outlined in the Flood Planning Guidelines.

4.0 STAGE 1: FLOOD RISK IDENTIFICATION

The potential sources of flooding to any site are varied and can include one or more of the following:

- Flooding from rivers (fluvial);
- Flooding from the sea or tidal (coastal);
- Flooding from land (pluvial);
- Flooding from groundwater and karst;
- Flooding from sewers; and
- Flooding from manmade impoundments (reservoirs, canals, and other artificial sources).

A desk top review of potential flooding at the site is undertaken in Section 4.1 and each potential source of flooding at the site are screened in Section 4.2.

4.1 Desktop review of potential flooding sources

4.1.1 Historical Mapping

Available Ordnance Survey of Ireland historical mapping indicates that several tributaries of the Boyne River are situated in close proximity to the site as well as the channel of the Boyne itself which is approximately 380 m from the site entrance at its closest point. The Annagh Stream runs along the western side of the site before discharging into the Boyne River.

A drain/ditch are noted along the northern border of the existing site. However, this drain is a relatively shallow field drain and shows no evidence of water flow.

No areas of the site are marked as being liable to flood in the historical past.

4.1.2 Topographic Surveys

Ground elevations range from approximately 100 mOD at the overburden storage area along the eastern/south-eastern corner of the existing site to 75 mOD in the current quarry void. The final quarry extraction area in the south of the site will be at c. 75.1 mOD, the level of the existing quarry floor. There is no proposal to extract deeper than this previously permitted limit.

Locally, elevations continue to fall westwards away from the site towards the banks of the Boyne River. The river channel of the Boyne is at an elevation of approximately 63mOD and 380m to the northwest of to the site. The river channel is approximately 3 m lower than the level of the public road along the northern boundary of the site which is at c. 66 mOD at the proposed new site entrance.

The processing area and plant/buildings at the site is at c. 69 to 70 mOD.

4.1.3 Local Surface Water Features

The principal water feature in the vicinity of the site is the Boyne River. The river flows generally northeast approximately 380m northwest of the site entrance. The Boyne continues generally in the same direction before turning east at Navan and discharging into the Irish sea at Drogheda.

As discussed above, the Annagh stream flows north along the western boundary of the site. This watercourse has not been altered by the development and continues to follow the same routes as highlighted on the historically mapping, flowing away from the site towards to the Boyne River. The channel of the Annagh Stream has however been modified, excavated out and deepened in the past to assist drainage.

The EPA is an independent public body established under the Environmental Protection Agency Act, 1992. The EPA hosted website (https://www.catchments.ie/) provides detailed maps of surface water bodies in Ireland.

It indicates that the source of the Annagh stream (Boyne_040) is located south of the site on the northern boundary of the bog woods approximately 1.7 km from the southern boundary of the site.

4.1.4 OPW Flood Mapping

The Office of Public Works (OPW) is the Government agency with statutory responsibility for flooding. The OPW website (www.floodinfo.ie) indicates that there are no recorded recurring flood events at the site.

A review of the OPW national coastal / tidal flood mapping indicates that the site is not at risk from coastal or tidal flooding.

The OPW CFRAM river flood extents: Mid-Range Future Scenario 0.1%Annual Exceedance Probability (AEP) flood event outline for the River Boyne has been digitised and is shown in **Figure FRA-2**. A series of survey points (i.e., ground elevations) were taken across the field where the edge of the flood outline lies closest to the site and the flood outline is at c. 65.7 mOD closest to the site, see **Figure FRA-2**. The 0.1% AEP flood outline represents the boundary between Flood Zone B and Flood Zone C, see Section 2.1 above.

The OPW CFRAM Mid-Range Future Scenario flood extents were generated taking in the potential effects of climate change using an increase in rainfall, and hence channel flows, of 20%.

The OPW CFRAM flood mapping indicates that the site is not at risk from fluvial flooding; and no past flood events are identified within the Boyne River catchment in proximity to the site.

4.1.5 Soils and Subsoils

The Environmental Protection Agency (EPA) website publishes soil and subsoil maps created by the Spatial Analysis Unit and Teagasc in collaboration with the Geological Survey of Ireland (GSI). Published soil mapping indicates that the soils at the site are predominately fine loamy drift with limestones.

There are no Alluvial subsoils present on the site which are laid down by river flood waters; the absence of alluvial subsoils indicates that the site is not within a flood zone and is therefore not considered to be at risk of flooding from a river source. There are alluvium subsoil deposits present on the site boundary along the Annagh Stream however there is no evidence of flooding at the site from this stream as the channel has been excavated and deepened significantly.

4.1.6 Groundwater and Karst

There is no indication of any groundwater springs at the site or on the Ordnance Survey of Ireland historical maps, which indicates that there is no potential for, or likelihood of, groundwater flooding to the site. In addition, the bedrock aquifer beneath the site is classified as a locally important aquifer which is generally moderately productive, and the gravel aquifer is classed as locally important.

There are no identified karst features beneath the site or in its vicinity and, therefore, there is no risk of groundwater flooding.

The quarry area has been worked dry to date. There is no proposal to deepen the quarry or extract rock beneath the groundwater table and therefore there will be no off-site discharge associated with the proposed development.

4.2 Flood Screening

The potential sources of flooding are:

- Flooding from rivers or fluvial flooding;
- Flooding from the sea or tidal flooding;
- Flooding from land;
- Flooding from groundwater and karst;

- Flooding from sewers; and
- Flooding from reservoirs, canals, and other artificial sources.

With reference to Section 4.1, the sources of flooding and the flood risk from each of these are considered in **Table 4-1** below and the potential flood risk from each source is screened here.

Table 4-1
Flood Risk Screening

Source of Flooding	Potential to Flood at the Site	Flood Screening – Potential Impact from Flooding
Flooding from rivers (fluvial)	The OPW CFRAM fluvial flood mapping indicates that the development is not at risk from river or fluvial flooding. Due to the steep topography and flow direction of the nearby minor watercourses (away from the site), it is assessed that the site is not at risk from fluvial flooding.	None
Flooding from the sea (coastal / tidal)	The OPW tidal / coastal flood mapping indicates that the site is not at risk from coastal or tidal flooding. Additionally, the site is located approximately 55km from the coast (Dublin City) and is at a significantly greater elevation. Therefore, there is no risk of coastal/tidal flooding.	None
Flooding from land (rainfall - pluvial)	Any rainwater falling directly on the site currently infiltrates into the ground. There is no risk of pluvial flooding.	None
Flooding from groundwater	The site is underlain by a locally important bedrock aquifer and gravel aquifer. There are no groundwater springs in the vicinity of the site which would have resulted in flooding in the past or which are likely to give rise to flooding in the future.	None
Flooding from karst	There are no identified karst features at the site.	None
Flooding from sewers	There are no sewers located within or in the proximity of the site.	None
Flooding from Impoundments - reservoirs and artificial sources	There are no artificial sources of water in the vicinity of the site.	None

4.3 Requirement for a Stage 2 Flood Risk Assessment

The Flood Planning Guidelines state that if a flood risk is identified at this Stage 1, it is necessary to progress and undertake a Stage 2 Initial Flood Risk Assessment for the site.

Each of the potential flooding sources have been assessed here based on the findings of a desktop study. The desktop survey has been verified by a site visit.

No potential flood risk sources have been identified and therefore there is no requirement to complete Stage 2 Initial Flood Risk Assessment.

5.0 CONCLUSIONS

A Stage 1 flood risk identification has been completed and concludes that the site is not at risk of flooding from all sources including tidal, fluvial, surface water, groundwater sources, and infrastructure failure.

6.0 CLOSURE

This report has been prepared by SLR Consulting (Ireland) with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

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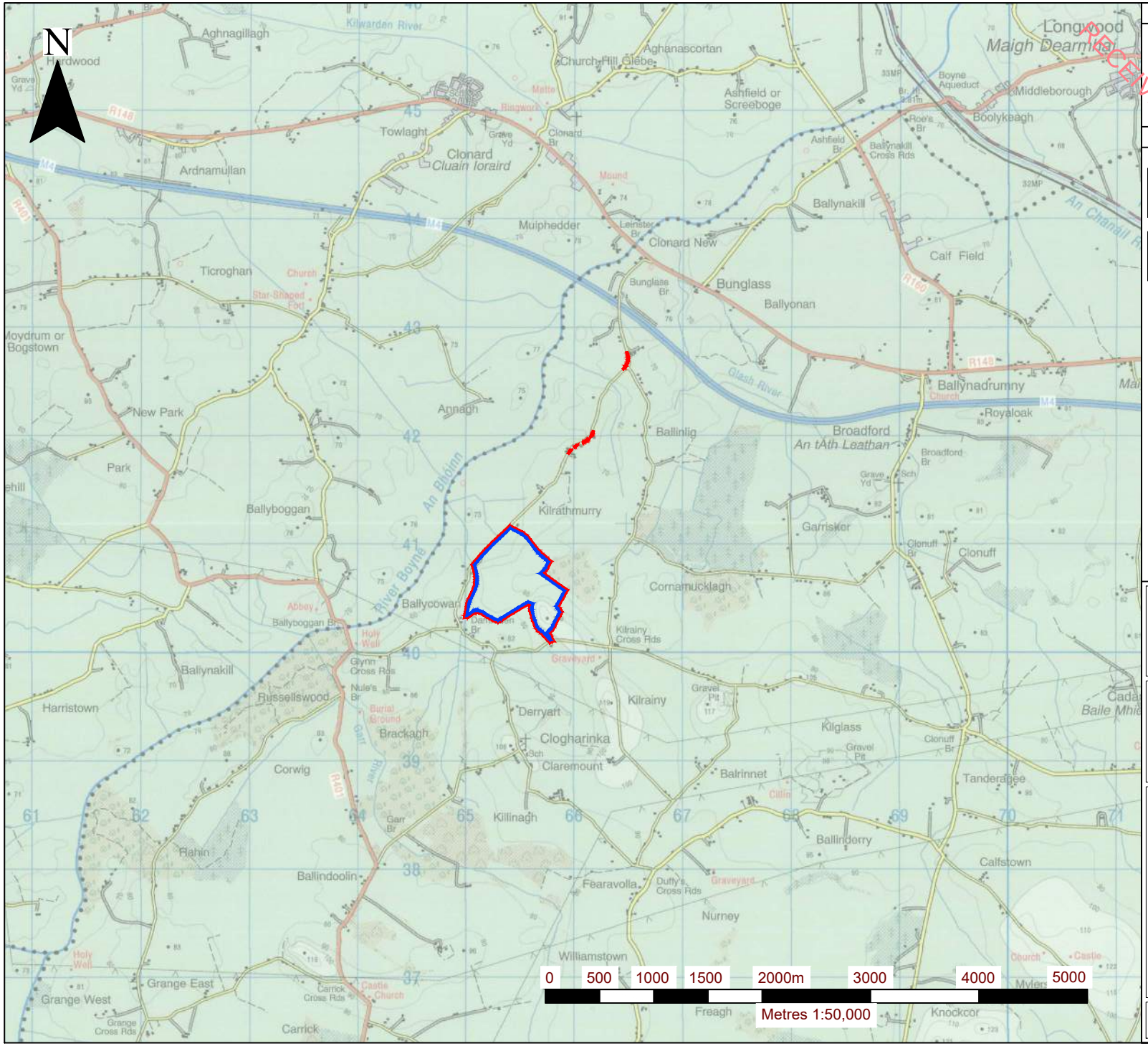
FIGURES

Figure FRA-1
Site Location

Figure FRA-2
Site Layout and River Boyne Flood Outline



NOTES

Extract from Ordnance Survey 1:50,000 Ordnance Survey Discovery Series Map No.49

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LEGEND

APPLICANTS LAND INTEREST BOUNDARY (c. 51.6 ha)

SITE APPLICATION AREA c.51.6 ha
TOTAL APPLICATION AREA c.51.7 ha
(Site & Road Works)

Kilsaran
ideas taking shape

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KILSARAN CONCRETE UNLIMITED COMPANY
FLOOD RISK ASSESSMENT REPORT

QUARRY DEVELOPMENT AT KILRATHMURRY & KILRAINY TOWNLANDS, CO. KILDARE

SITE LOCATION

FIGURE FRA-1

Scale
1:50,000 @ A4

Date
SEPTEMBER 2023

00036.065251 Clonard EIAR Fig 1 FRA.dwg

OSi PLACE Map

Flood Outline Surveyed at c. 65.7mOD

Proposed New Entrance
(Entrance to be constructed with fall back into site away from public road)

Existing Agricultural Lands

Proposed Acoustic Fence (c.170m)

Public Road

Proposed Internal Barrier

New Internal Access Road

Proposed Wheelwash

Existing Site Entrance (to be closed)

Existing Agricultural Lands

Retained Hedgerow

5.2 Ha. area restored to Agriculture (completed 2020)

Proposed Screening Berm

Existing Wheewash (to be removed and replaced with new along new access road)

2.5 Ha. area for restoration 1 year following closure of existing entrance

Existing Weighbridge

Existing Effluent Treatment

Existing Office

Existing Car Parking

Existing Readymix Plant

Existing Workshop including bunded fuel storage and site laboratory

ESB Substation

Overburden Storage Area

Existing Access Road (to be replaced)

Existing Silt Lagoon

Existing Aggregates Processing Plant (crushing, washing & screening)

Proposed Lateral Quarry Extension

Existing Silt Lagoon

Existing Silt Lagoon

Existing Silt Lagoon

Final Quarry Extraction Area at c.75.1m AOD

P.Ref.99/2042 Quarry Footprint

Quarry Bench

Quarry Face

Final Quarry Extraction Area (c.6.2 Ha.)

0 50 100 150 200m 300 400 500

Metres 1:5000

RECEIVED: 02/10/2023

N

NOTES

Extract from Ordnance Survey 1:5000 Sheets 3119 & 3051

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LEGEND

APPLICANTS LAND INTEREST BOUNDARY (c. 51.6 ha)

SITE APPLICATION AREA c.51.6 ha
TOTAL APPLICATION AREA c.51.7 ha
(Site & Road Works)

RIVER BOYNE FLOOD OUTLINE - OPW CFRAM RIVER FLOOD EXTENTS: MID RANGE FUTURE SCENARIO 0.1% ANNUAL EXCEEDENCE PROBABILITY FLOOD EVENT (SOURCE: www.floodinfo.ie).

THE OPW CFRAM FLOOD OUTLINE WAS SURVEYED AT AN ELEVATION OF c. 65.7mOD AT THE CLOSEST POINT TO THE SITE

Kilsaran
ideas taking shape

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KILSARAN CONCRETE UNLIMITED COMPANY
FLOOD RISK ASSESSMENT REPORT

QUARRY DEVELOPMENT AT KILRATHMURRY & KILRAINY TOWNLANDS, CO. KILDARE

FLOOD RISK ASSESSMENT

FIGURE FRA-2

Scale: 1:5,000 @ A3

Date: SEPTEMBER 2023

00036.065251 Clonard EIAR Fig 2 FRA.dwg

Appendix 7-G
Well Survey

Well Survey

Client:	**Kilsaran**	Well No.:	**R1&R2**
Project No.:	501.036.0101	Dist. to Footprint:	
Project Name:	Clonard EIAR	Water Use:	
Surveyed by:	JS&HM		
Date:	24/01/2022		

WELL OWNER DETAILS:

Name:	Thomas O'Toole	Mobile No.:	
Address:	Clonard, Co. Kildare	Phone No.:	

LOCATION:

Townland:	Kilrainy & Kilrathmurry	O.S. Map:	Discover Series Sheet 49
County:	Kildare	6" Sheet No.:	na.
Grid. Ref. (ITM):		Design Map:	Well

WELL DETAILS:

Drilled by:		Well Head Elev.:		Casing Length:	
Drilling Method:		Well Construction:		Casing Diameter:	
Date completed:		Well Depth:	13ft	Screen Length:	

Well Type: Borehole ✓ Dug Well Spring		Screen Diameter:	na.
WATER:	Yield: na.	W.H. > G.L.	na.

Static Water Level:	4.46m bgl	Well Test: Yes ✓ No (if yes, please give details below).
Water Entry Levels:	na.	
Water Quality:		

Copy of Analysis: ☐ Yes ☐ No		Date of Analysis:	

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

General Land Use:		Drainage:	

GEOLOGICAL LOG:

Soil Type:	na.	Bedrock:	Limestone (Edenderry Oolite)
Overburden:	Glacial Till	Depth to bedrock:	na.

POTENTIAL SOURCES OF POLLUTION:

Septic Tank Location:	na.	Well Distance:	<20m
Effluent Disposal System:	Single WWTS / Septic tank		
Other Sources:		Well Distance:	
Nat. Grid. Ref.:			

Comments:
1. Well is pumped and serves a single dwelling.
2. See EIAR Figure 7-10 for well/residence locations
3 Two wells present on site for R1 and R2 but it was only possible to measure one water level.
4

Photographs:
Well detail:

Well Survey

Client:	**Kilsaran**	Well No.:	**R21**
Project No.:	501.036.0101	Dist. to Footprint:	
Project Name:	Clonard EIAR	Water Use:	
Surveyed by:	JS&HM		
Date:	24/01/2022		

WELL OWNER DETAILS:

Name:	Hilary Carthy	Mobile No.:	
Address:	Clonard, Co. Kildare	Phone No.:	

LOCATION:

Townland:	Kilrainy & Kilrathmurry	O.S. Map:	Discover Series Sheet 49
County:	Kildare	6" Sheet No.:	na.
Grid. Ref. (ITM):		Design Map:	Well

WELL DETAILS:

Drilled by:		Well Head Elev.:		Casing Length:	
Drilling Method:		Well Construction:		Casing Diameter:	
Date completed:		Well Depth:		Screen Length:	

Well Type:	Borehole ✓	Dug Well	Spring	Screen Diameter:	na.
WATER:		Yield:	na.	W.H. > G.L.	na.
Static Water Level:	2.23m bgl	Well Test:	Yes ✓ No (if yes, please give details below).		
Water Entry Levels:	na.				
Water Quality:					

Copy of Analysis: ☐ Yes ☐ No		Date of Analysis:	

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

General Land Use:		Drainage:	

GEOLOGICAL LOG:

Soil Type:	na.	Bedrock:	Limestone (Edenderry Oolite)
Overburden:	Glacial Till	Depth to bedrock:	na.

POTENTIAL SOURCES OF POLLUTION:

Septic Tank Location:	na.	Well Distance:	<20m
Effluent Disposal System:	Single WWTS / Septic tank		
Other Sources:		Well Distance:	
Nat. Grid. Ref.:			

Comments:
1. Well is pumped and serves a single dwelling.
2. See EIAR Figure 7-10 for well/residence locations
3
4

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Well Survey

Client:	**Kilsaran**	Well No.:	**R34**
Project No.:	501.036.0101	Dist. to Footprint:	
Project Name:	Clonard EIAR	Water Use: Domstic Residence	
Surveyed by:	DB (call)		
Date:	24/01/2022		

WELL OWNER DETAILS:

Name:	Paula Walsh	Mobile No.:	
Address:	Clonard, Co. Kildare	Phone No.:	

LOCATION:

Townland:	Kilrainy & Kilrathmurry	O.S. Map:	Discover Series Sheet 49
County:	Kildare	6" Sheet No.:	na.
Grid. Ref. (ITM):		Design Map:	Well

WELL DETAILS:

Drilled by:	na	Well Head Elev.:	na.	Casing Length:	
Drilling Method:	na.	Well Construction:	New	Casing Diameter:	
Date completed:	2017	Well Depth:	na.	Screen Length:	

Well Type:	Borehole ✓	Dug Well	Spring	Screen Diameter:	na.
WATER:		Yield:	na.	W.H. > G.L.	na.
Static Water Level:	na.	Well Test:	Yes ✓ No (if yes, please give details below).		
Water Entry Levels:	na.				
Water Quality:					

Copy of Analysis: ☐ Yes ☐ No		Date of Analysis:	

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

General Land Use:		Drainage:	

GEOLOGICAL LOG:

Soil Type:	na.	Bedrock:	Limestone (Edenderry Oolite)
Overburden:	Glacial Till	Depth to bedrock:	na.

POTENTIAL SOURCES OF POLLUTION:

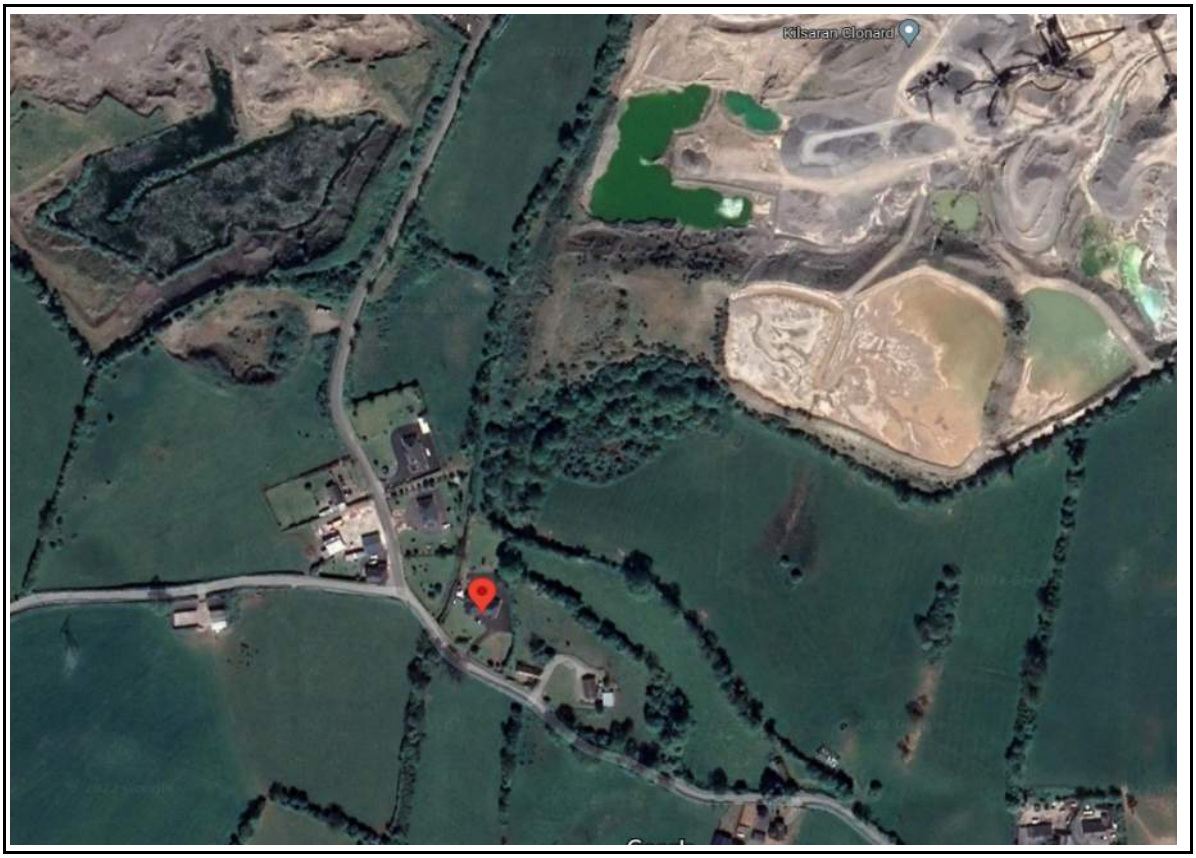
Septic Tank Location:	na.	Well Distance:	<20m
Effluent Disposal System:	Single WWTS / Septic tank		
Other Sources:		Well Distance:	
Nat. Grid. Ref.:			

Comments:
1. Well installed in c. 2017 to serve existing residence. New well required due to falling groundwater levels.
2. See EIAR Figure 7-10 for well/residence locations
3. All residential properties in the area are served by private wells
4. Call to SLR after site Well Survey completed

Photographs:

Well detail:

Well location:



Well Survey

Client:	**Kilsaran**	Well No.:	**R39**
Project No.:	501.036.0101	Dist. to Footprint:	
Project Name:	Clonard EIAR	Water Use: Domstic Residence	
Surveyed by:	DB (call)		
Date:	24/01/2022		

WELL OWNER DETAILS:

Name:	Martha Dalton	Mobile No.:	
Address:	Clonard, Co. Kildare	Phone No.:	

LOCATION:

Townland:	Kilrainy & Kilrathmurry	O.S. Map:	Discover Series Sheet 49
County:	Kildare	6" Sheet No.:	na.
Grid. Ref. (ITM):		Design Map:	Well

WELL DETAILS:

Drilled by:	na	Well Head Elev.:	na.	Casing Length:	
Drilling Method:	na.	Well Construction:	New	Casing Diameter:	
Date completed:	2021/22	Well Depth:	na.	Screen Length:	

Well Type:	Borehole ✓	Dug Well	Spring	Screen Diameter:	na.
WATER:		Yield:	na.	W.H. > G.L.	na.
Static Water Level:	na.	Well Test:	Yes ✓ No (if yes, please give details below).		
Water Entry Levels:	na.				
Water Quality:					

Copy of Analysis: ☐ Yes ☐ No		Date of Analysis:	

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

General Land Use:		Drainage:	

GEOLOGICAL LOG:

Soil Type:	na.	Bedrock:	Limestone (Edenderry Oolite)
Overburden:	Glacial Till	Depth to bedrock:	na.

POTENTIAL SOURCES OF POLLUTION:

Septic Tank Location:	na.	Well Distance:	<20m
Effluent Disposal System:	Single WWTS / Septic tank		
Other Sources:		Well Distance:	
Nat. Grid. Ref.:			

Comments:
1. New well installed to serve existing residence.
2. See EIAR Figure 7-10 for well/residence locations
3. All residential properties in the area are served by private wells
4. Call to SLR after site Well Survey completed

Photographs:
Well detail:

Well location:

Well Survey

Client:	**Kilsaran**	Well No.:	**R40**
Project No.:	501.036.0101	Dist. to Footprint:	
Project Name:	Clonard EIAR	Water Use:	
Surveyed by:	JS&HM		
Date:	24/01/2022		

WELL OWNER DETAILS:

Name:	Martha Swan	Mobile No.:	
Address:	Clonard, Co. Kildare	Phone No.:	

LOCATION:

Townland:	Kilrainy & Kilrathmurry	O.S. Map:	Discover Series Sheet 49
County:	Kildare	6" Sheet No.:	na.
Grid. Ref. (ITM):		Design Map:	Well

WELL DETAILS:

Drilled by:		Well Head Elev.:		Casing Length:	
Drilling Method:		Well Construction:		Casing Diameter:	
Date completed:		Well Depth:		Screen Length:	

Well Type:	Borehole ✓	Dug Well	Spring	Screen Diameter:	na.
WATER:		Yield:	na.	W.H. > G.L.	na.

Static Water Level:	4.04m bgl	Well Test: Yes ✓ No (if yes, please give details below).
Water Entry Levels:	na.	
Water Quality:		

Copy of Analysis: ☐ Yes ☐ No		Date of Analysis:	

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

General Land Use:		Drainage:	

GEOLOGICAL LOG:

Soil Type:	na.	Bedrock:	Limestone (Edenderry Oolite)
Overburden:	Glacial Till	Depth to bedrock:	na.

POTENTIAL SOURCES OF POLLUTION:

Septic Tank Location:	na.	Well Distance:	<20m
Effluent Disposal System:	Single WWTS / Septic tank		
Other Sources:		Well Distance:	
Nat. Grid. Ref.:			

Comments:
1. Well is pumped and serves a single dwelling.
2. See EIAR Figure 7-10 for well/residence locations
3
4

Photographs:

Well detail:

Well location:

Well Survey

Client:	**Kilsaran**	Well No.:	**R1&R2**
Project No.:	501.036.0101	Dist. to Footprint:	
Project Name:	Clonard EIAR	Water Use: Home supply	
Surveyed by:	CF and GC		
Date:	25/05/2022		

WELL OWNER DETAILS:

Name:	Thomas O'Toole	Mobile No.:	863345624
Address:	Clonard, Co. Kildare	Phone No.:	

LOCATION:

Townland:	Kilrainy & Kilrathmurry	O.S. Map:	Discover Series Sheet 49
County:	Kildare	6" Sheet No.:	na.
Grid. Ref. (ITM):		Design Map:	Well

WELL DETAILS:

Drilled by:	Dempsey Drilling	Well Head Elev.:		Casing Length:	
Drilling Method:		Well Construction:		Casing Diameter:	
Date completed:		Well Depth:	14ft	Screen Length:	

Well Type:	Borehole ✓	Dug Well ✓	Spring	Screen Diameter:	na.
WATER:		Yield:	na.	W.H. > G.L.	na.

Static Water Level:	4.6m bgl	Well Test: Yes ✓ No (if yes, please give details below).
Water Entry Levels:	na.	
Water Quality:		

Copy of Analysis: ☐ Yes ☐ No		Date of Analysis:	

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

General Land Use:	Residential	Drainage:	

GEOLOGICAL LOG:

Soil Type:	na.	Bedrock:	Limestone (Edenderry Oolite)
Overburden:	Glacial Till	Depth to bedrock:	na.

POTENTIAL SOURCES OF POLLUTION:

Septic Tank Location:	na.	Well Distance:	<20m
Effluent Disposal System:	Single WWTS / Septic tank		

Other Sources:		Well Distance:	
Nat. Grid. Ref.:			

Comments:
1. Well is pumped and serves two adjacent dwellings
2. See EIAR Figure 7-10 for well/residence locations
3 Two wells present on site for R1 and R2 but it was only possible to measure one water level
4. Second well was said to be 180ft (54.9m) deep, drilled "recently"
5. 1st well was a dug well, second was drilled well

Photographs:
Well detail:

Well location:

Well Survey

Client:	**Kilsaran**	Well No.: 24	
Project No.:	501.036.0101	Dist. to Footprint:	
Project Name:	Clonard EIAR	Water Use: Home supply	
Surveyed by:	CF&GC		
Date:	25/05/2022		

WELL OWNER DETAILS:

Name:	-	Mobile No.:	
Address:	Clonard, Co. Kildare	Phone No.:	

LOCATION:

Townland:	Kilrainy & Kilrathmurry	O.S. Map:	Discover Series Sheet 49
County:	Kildare	6" Sheet No.:	na.
Grid. Ref. (ITM):		Design Map:	

WELL DETAILS:

Drilled by:		Well Head Elev.:		Casing Length:	
Drilling Method:		Well Construction:		Casing Diameter:	
Date completed:		Well Depth:		Screen Length:	

Well Type: Borehole ✓ Dug Well Spring		Screen Diameter:	
WATER:	Yield:	W.H. > G.L.	
Static Water Level:	Well Test: Yes ✓ No (if yes, please give details below).		
Water Entry Levels:			
Water Quality:			

Copy of Analysis: ☐ Yes ☐ No		Date of Analysis:	

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

General Land Use:	Residential	Drainage:	

GEOLOGICAL LOG:

Soil Type:		Bedrock:	Limestone (Edenderry Oolite)
Overburden:	Glacial Till	Depth to bedrock:	

POTENTIAL SOURCES OF POLLUTION:

Septic Tank Location:	Back garden	Well Distance:	approx, 20m
Effluent Disposal System:	Septic tank		
Other Sources:		Well Distance:	
Nat. Grid. Ref.:			

Comments:
1. Well connected to pump that is housed in shed
2. Couldn't see well, potentially covered with concrete
3. Septic tank in garden approx. 20m from pump house
4. Home-owners not home, info gathered from son.

Well Survey

Client:	**Kilsaran**	Well No.:	**28**
Project No.:	501.036.0101	Dist. to Footprint:	
Project Name:	Clonard EIAR	Water Use: Home supply	
Surveyed by:	CF&GC		
Date:	25/05/2022		

WELL OWNER DETAILS:

Name:		Mobile No.:	
Address:	Clonard, Co. Kildare	Phone No.:	

LOCATION:

Townland:	Kilrainy & Kilrathmurry	O.S. Map:	Discover Series Sheet 49
County:	Kildare	6" Sheet No.:	na.
Grid. Ref. (ITM):		Design Map:	

WELL DETAILS:

Drilled by:	-	Well Head Elev.:		Casing Length:	
Drilling Method:	-	Well Construction:		Casing Diameter:	
Date completed:	2008	Well Depth:		Screen Length:	

Well Type: Borehole ✓ Dug Well Spring		Screen Diameter:	
WATER:	Yield:	W.H. > G.L.	
Static Water Level:	Well Test: Yes ✓ No (if yes, please give details below).		
Water Entry Levels:			
Water Quality:			
Copy of Analysis: ☐ Yes ☐ No	Date of Analysis:		

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

General Land Use:	Residential	Drainage:	

GEOLOGICAL LOG:

Soil Type:		Bedrock:	Limestone (Edenderry Oolite)
Overburden:	Glacial Till	Depth to bedrock:	

POTENTIAL SOURCES OF POLLUTION:

Septic Tank Location:	Back garden	Well Distance:	>50m
Effluent Disposal System:	Septic tank		
Other Sources:		Well Distance:	
Nat. Grid. Ref.:			

Comments:
1. Well was covered with a cap connecting it directly to a pump - unable to dip
2
3

Photographs:

Well detail:

Well location:

Well Survey

Client:	**Kilsaran**	Well No.:	**R33**
Project No.:	501.036.0101	Dist. to Footprint:	
Project Name:	Clonard EIAR	Water Use: Home supply	
Surveyed by:	CF&GC		
Date:	25/05/2022		

WELL OWNER DETAILS:

Name:	Irene Farrell	Mobile No.:	872103854
Address:	Clonard, Co. Kildare	Phone No.:	

LOCATION:

Townland:	Kilrainy & Kilrathmurry	O.S. Map:	Discover Series Sheet 49
County:	Kildare	6" Sheet No.:	na.
Grid. Ref. (ITM):		Design Map:	

WELL DETAILS:

Drilled by:		Well Head Elev.:		Casing Length:	
Drilling Method:		Well Construction:		Casing Diameter:	
Date completed:	1984	Well Depth:	18.18m	Screen Length:	

Well Type: Borehole ✓ Dug Well Spring		Screen Diameter:	
WATER:	Yield:	W.H. > G.L.	
Static Water Level: 7.4 mbtoconcrete	Well Test: Yes ✓ No (if yes, please give details below).		
Water Entry Levels:			
Water Quality:			

Copy of Analysis: ☐ Yes ☐ No		Date of Analysis:	

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

General Land Use:	Residential	Drainage:	

GEOLOGICAL LOG:

Soil Type:		Bedrock:	Limestone (Edenderry Oolite)
Overburden:	Glacial Till	Depth to bedrock:	

POTENTIAL SOURCES OF POLLUTION:

Septic Tank Location:		Well Distance:	>20m
Effluent Disposal System:	Septic tank		
Other Sources:		Well Distance:	
Nat. Grid. Ref.:			

Comments:
1. Well located next to pump house on the property.
2
3

Well Survey

Client:	**Kilsaran**	Well No.:	**R23**
Project No.:	501.036.0101	Dist. to Footprint:	
Project Name:	Clonard EIAR	Water Use: Home supply	
Surveyed by:	CF&GC		
Date:	25/05/2022		

WELL OWNER DETAILS:

Name:	William Walsh	Mobile No.:	879561241
Address:	Clonard, Co. Kildare	Phone No.:	

LOCATION:

Townland:	Kilrainy & Kilrathmurry	O.S. Map:	Discover Series Sheet 49
County:	Kildare	6" Sheet No.:	na.
Grid. Ref. (ITM):		Design Map:	

WELL DETAILS:

Drilled by:	Dunnes Drilling	Well Head Elev.:		Casing Length:	
Drilling Method:		Well Construction:		Casing Diameter:	
Date completed:	1978	Well Depth:	5.9m	Screen Length:	

Well Type:	Borehole ✓	Dug Well	Spring	Screen Diameter:	
WATER:		Yield:		W.H. > G.L.	
Static Water Level:	2.68mbgl	Well Test:	Yes ✓ No (if yes, please give details below).		
Water Entry Levels:					
Water Quality:					

Copy of Analysis: ☐ Yes ☐ No		Date of Analysis:	

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

General Land Use:		Drainage:	

GEOLOGICAL LOG:

Soil Type:		Bedrock:	Limestone (Edenderry Oolite)
Overburden:	Glacial Till	Depth to bedrock:	

POTENTIAL SOURCES OF POLLUTION:

Septic Tank Location:	Field across from dwelling	Well Distance:	approx. 10m
Effluent Disposal System:	Septic tank		
Other Sources:		Well Distance:	
Nat. Grid. Ref.:			

Comments:
1. Resident comlained of lime problem, which worsens after blasts
2. Field where the well is also is where the septic tank is located
3

Well Survey

Client:	**Kilsaran**	Well No.:	**17**
Project No.:	501.036.0101	Dist. to Footprint:	
Project Name:	Clonard EIAR	Water Use: Home supply	
Surveyed by:	CF&GC		
Date:	25/05/2022		

WELL OWNER DETAILS:

Name:	Declan Noonan	Mobile No.:	86307818
Address:	Clonard, Co. Kildare	Phone No.:	

LOCATION:

Townland:	Kilrainy & Kilrathmurry	O.S. Map:	Discover Series Sheet 49
County:	Kildare	6" Sheet No.:	na.
Grid. Ref. (ITM):		Design Map:	

WELL DETAILS:

Drilled by:		Well Head Elev.:		Casing Length:	
Drilling Method:		Well Construction:		Casing Diameter:	
Date completed:	2007	Well Depth:	3.66m (12ft)	Screen Length:	

Well Type: Borehole ✓ Dug Well Spring ✓		Screen Diameter:	
WATER:	Yield:	W.H. > G.L.	
Static Water Level:	Well Test: Yes ✓ No (if yes, please give details below).		
Water Entry Levels:			
Water Quality:			
Copy of Analysis: ☐ Yes ☐ No	Date of Analysis:		

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

General Land Use:	Residential	Drainage:	

GEOLOGICAL LOG:

Soil Type:		Bedrock:	Limestone (Edenderry Oolite)
Overburden:	Glacial Till	Depth to bedrock:	

POTENTIAL SOURCES OF POLLUTION:

Septic Tank Location:	Front Garden	Well Distance:	>50m
Effluent Disposal System:	Septic Tank		
Other Sources:		Well Distance:	
Nat. Grid. Ref.:			

Comments:
1. Homeowner said the well was a natural spring/artesian well
2. Well was capped
3

Well Survey

Client:	**Kilsaran**	Well No.:	**R5**
Project No.:	501.036.0101	Dist. to Footprint:	
Project Name:	Clonard EIAR	Water Use: Home supply	
Surveyed by:	CF&GC		
Date:	25/05/2022		

WELL OWNER DETAILS:

Name:	Joseph Robinson	Mobile No.:	871744582
Address:	Clonard, Co. Kildare	Phone No.:	46955213

LOCATION:

Townland:	Kilrainy & Kilrathmurry	O.S. Map:	Discover Series Sheet 49
County:	Kildare	6" Sheet No.:	na.
Grid. Ref. (ITM):		Design Map:	

WELL DETAILS:

Drilled by:		Well Head Elev.:		Casing Length:	
Drilling Method:		Well Construction:		Casing Diameter:	
Date completed:		Well Depth:		Screen Length:	

Well Type: Borehole ✓ Dug Well ✓ Spring		Screen Diameter:	
WATER:	Yield:	W.H. > G.L.	

Static Water Level:	Well Test: Yes ✓ No (if yes, please give details below).
Water Entry Levels:	
Water Quality:	

Copy of Analysis: ☐ Yes ☐ No		Date of Analysis:	

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

General Land Use:	Residential/Old Farm	Drainage:	

GEOLOGICAL LOG:

Soil Type:		Bedrock:	Limestone (Edenderry Oolite)
Overburden:	Glacial Till	Depth to bedrock:	

POTENTIAL SOURCES OF POLLUTION:

Septic Tank Location:	Field behind dwelling	Well Distance:	approx. 400m (0.25 miles)
Effluent Disposal System:	Septic Tank		

Other Sources:		Well Distance:	
Nat. Grid. Ref.:			

Comments:
1. Original well is dry, borehole was drilled at the base of original well to access deeper groundwater
2. Approx 7.2m to the base of original well.
3. Couldn't get the dip meter into the borehole at the base of the original well.

Photographs:

Well detail:

Well location:

Appendix 7-H
Groundwater Quality Results and Laboratory Certificates

Complete Laboratory Solutions
[Tel] 091 574355
[Fax] 091 574356
[Email] services@cls.ie
[web] www.cls.ie

CERTIFICATE OF ANALYSIS

Client : James Kelliher Environmental officer
Kilsaran International Concrete Ltd.
Piercetown
Dunboyne
Co. Meath A86 W820

Report No. : 516172
Date of Receipt : 30/03/2023
Start Date of Analysis : 30/03/2023
Date of Report : 25/04/2023
Order Number :
Sample taken by : Client

Lab No	Sample Description	Test	Ref.	Result	Units
1598398	21-CL-01	TON as N	I,R	2.29	mg/l
		pH	I,R	7.2	pH Units
		Conductivity @20C	I,R	769	uS/cm
		Ammonia as NH3-N	I,R	<0.005	mg/l
		Chloride	I,R	27.1	mg/l
		Ammonium as NH4	I,R	<0.01	mg/l
		Nitrate as NO3	I,R	10.1	mg/l
		Nitrite as NO2	I,R	<0.017	mg/l
		Sodium, dissolved	I,R	11	mg/l
		Total Phosphorus as P (filtered 0.45um)	R	<0.05	mg/l
		Calcium, dissolved	I,R	130	mg/l
		Magnesium, total	I,R	16	mg/l
		Cyanide, total low level (non-DW) WAS018	S	<0.009	mg/l
		Sulphate (SO4)	I,R	21.6	mg/l
		Fluoride (Non-potable) by ISE	S	0.2	mg/l
		Manganese, total	I,R	24	ug/l
		Ammonia as NH3	I,R	<0.006	mg/l
		Aluminium, Total	I,R	43	ug/l
		Iron, dissolved	I,R	64	ug/l
		Copper, dissolved	I,R	<1	ug/l
		Lead, dissolved	I,R	<0.5	ug/l
		Chromium, dissolved	I,R	<0.5	ug/l
		Nickel, dissolved	I,R	8	ug/l
		Cadmium, dissolved	I,R	<0.5	ug/l
		Mercury, dissolved	I,R	0.16	ug/l
		Antimony, dissolved	I,R	1	ug/l
		Selenium, dissolved	I,R	1	ug/l
		Zinc, dissolved	I,R	22	ug/l
		Potassium, dissolved	I,R	2	mg/l
		Barium, dissolved	I,R	114	ug/l
		Boron, dissolved	I,R	<10	ug/l
		TPH CWG (>C5-C44) Banded- incl. BTEX/MTBE	S	<10	ug/l
		Vanadium, dissolved	I,R	<0.5	ug/l
		Total Coliforms (Filtration) (Environmental Waters)	I,R	103 est	cfu/100ml
		Sulphide as S	S	<0.01	mg/l
		Molybdate Reactive Phosphorus (MRP unfiltered) as PO4-P	I,R	<0.01	mg/l
		Faecal Coliforms Filtration	I,R	85	cfu/100ml
		Phosphate as P filtered (low level SW or saline)	I,R	0.011	mg/l
		Cyanide, free (WAS018)	S	<0.008	mg/l

ISO 17025

Approved by: Ann Marie Nee

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AnnMarie Nee
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Services Administrator

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In-House Test	Specification	Expanded Measurement of Uncertainty	17025	GMP/FDA*	ISO**
TON as N	Konelab CLS 38	+/- 8.51 %	Yes	No	Yes
pH	CLS 26	+/- 0.133 pH units	Yes	No	Yes
Conductivity @20C	CLS 67	+/- 4.92 %	Yes	No	Yes
Ammonia as NH3-N	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Chloride	Konelab CLS 36	+/- 12.10 %	Yes	No	Yes
Ammonium as NH4	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Nitrate as NO3	Konelab CLS 39	+/- 2 @ 17 mg/l NO3	Yes	No	Yes
Nitrite as NO2	Konelab CLS 37	+/- 5.83 %	Yes	No	Yes
Sodium, dissolved	ICP-MS CLS129	+/- 11.62 %	Yes	No	Yes
Total Phosphorus as P (filtered 0.45um)	Filtration prior to CLS 151	+/- 18.01 %	No	No	Yes
Calcium, dissolved	ICP-MS CLS129	+/-5.5@30mg/l	Yes	No	Yes
Magnesium, total	ICP-MS CLS129	+/-0.74@4mg/l	Yes	No	Yes
Sulphate (SO4)	Konelab CLS 88	+/- 7.29 %	Yes	No	Yes
Manganese, total	ICP-MS CLS129	+/- 14.53 %	Yes	No	Yes
Ammonia as NH3	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Aluminium, Total	ICP-MS CLS129	+/- 11.75 %	Yes	No	Yes
Iron, dissolved	ICP-MS CLS 129	+/- 10.28 %	Yes	No	Yes
Copper, dissolved	ICP-MS CLS 129	+/- 11.28 %	Yes	No	Yes
Lead, dissolved	ICP-MS CLS129	+/-20@100ug/l	Yes	No	Yes
Chromium, dissolved	ICP-MS CLS 129	+/- 8.38 %	Yes	No	Yes
Nickel, dissolved	ICP-MS CLS129	+/- 7.91 %	Yes	No	Yes
Cadmium, dissolved	ICP-MS CLS129	+/- 10.42 %	Yes	No	Yes
Mercury, dissolved	ICP-MS CLS 129	+/- 27.72 %	Yes	No	Yes
Antimony, dissolved	ICP-MS CLS 129	+/- 13.23 %	Yes	No	Yes
Selenium, dissolved	ICP-MS CLS129	+/-0.9@5ug/l	Yes	No	Yes
Zinc, dissolved	ICP-MS CLS 129	+/- 9.38 %	Yes	No	Yes
Potassium, dissolved	ICP-MS CLS129	+/-0.53@5mg/l	Yes	No	Yes
Barium, dissolved	ICP-MS CLS129	+/-33@250ug/l	Yes	No	Yes
Boron, dissolved	ICP-MS CLS129	+/-15@200ug/l	Yes	No	Yes
Vanadium, dissolved	ICP-MS CLS 129	+/- 11.72 %	Yes	No	Yes
Total Coliforms (Filtration) (Environmental Waters)	CLS 16	±2.76 cfu/100ml	Yes	No	Yes
Molybdate Reactive Phosphorus (MRP unfiltered) as PO4-P	Konelab CLS 35	+/- 0.04 @ 0.3 mg/l PO4	Yes	No	Yes
Faecal Coliforms Filtration	CLS 16 based on The Microbiology of Recreational and Environmental Waters 2000	±4.38 cfu/100ml	Yes	No	Yes
Phosphate as P filtered (low level SW or saline)	CLS 205		Yes	No	Yes

*Analysis carried out in a GMP approved, FDA inspected facility (MedPharma site only).
**Laboratory Analysis, Sampling, Food Safety Monitoring and Analysts on Contract are all ISO 9001 certified.

Lab No	Sample ID	Sample Condition on Receipt	Sampling Date
1598398	21-CL-01	Good condition	29/03/2023

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CERTIFICATE OF ANALYSIS

Client : James Kelliher Environmental officer
Kilsaran International Concrete Ltd.
Piercetown
Dunboyne
Co. Meath A86 W820

Report No. : 516174
Date of Receipt : 30/03/2023
Start Date of Analysis : 30/03/2023
Date of Report : 25/04/2023
Order Number :
Sample taken by : Client

Lab No	Sample Description	Test	Ref.	Result	Units
1598401	21-CL-02	TON as N	I,R	<0.1	mg/l
		pH	I,R	7.4	pH Units
		Conductivity @20C	I,R	618	uS/cm
		Ammonia as NH3-N	I,R	0.172	mg/l
		Chloride	I,R	9.52	mg/l
		Ammonium as NH4	I,R	0.222	mg/l
		Nitrate as NO3	I,R	<0.44	mg/l
		Nitrite as NO2	I,R	<0.017	mg/l
		Sodium, dissolved	I,R	6	mg/l
		Total Phosphorus as P (filtered 0.45um)	R	<0.05	mg/l
		Calcium, dissolved	I,R	99	mg/l
		Magnesium, total	I,R	22	mg/l
		Cyanide, total low level (non-DW) WAS018	S	<0.009	mg/l
		Sulphate (SO4)	I,R	66.7	mg/l
		Fluoride (Non-potable) by ISE	S	0.4	mg/l
		Manganese, total	I,R	459	ug/l
		Ammonia as NH3	I,R	0.279	mg/l
		Aluminium, Total	I,R	305	ug/l
		Iron, dissolved	I,R	131	ug/l
		Copper, dissolved	I,R	<1	ug/l
		Lead, dissolved	I,R	<0.5	ug/l
		Chromium, dissolved	I,R	<0.5	ug/l
		Nickel, dissolved	I,R	3	ug/l
		Cadmium, dissolved	I,R	<0.5	ug/l
		Mercury, dissolved	I,R	<0.05	ug/l
		Antimony, dissolved	I,R	1	ug/l
		Selenium, dissolved	I,R	<0.5	ug/l
		Zinc, dissolved	I,R	<5	ug/l
		Potassium, dissolved	I,R	1	mg/l
		Barium, dissolved	I,R	174	ug/l
		Boron, dissolved	I,R	10	ug/l
		TPH CWG (>C5-C44) Banded- incl. BTEX/MTBE	S	<10	ug/l
		Vanadium, dissolved	I,R	<0.5	ug/l
		Total Coliforms (Filtration) (Environmental Waters)	I,R	0	cfu/100ml
		Sulphide as S	S	<0.01	mg/l
		Molybdate Reactive Phosphorus (MRP unfiltered) as PO4-P	I,R	<0.01	mg/l
		Faecal Coliforms Filtration	I,R	0	cfu/100ml
		Phosphate as P filtered (low level SW or saline)	I,R	0.003	mg/l
		Cyanide, free (WAS018)	S	<0.008	mg/l

Approved by: Ann Marie Nee

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In-House Test	Specification	Expanded Measurement of Uncertainty	17025	GMP/FDA*	ISO**
TON as N	Konelab CLS 38	+/- 8.51 %	Yes	No	Yes
pH	CLS 26	+/- 0.133 pH units	Yes	No	Yes
Conductivity @20C	CLS 67	+/- 4.92 %	Yes	No	Yes
Ammonia as NH3-N	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Chloride	Konelab CLS 36	+/- 12.10 %	Yes	No	Yes
Ammonium as NH4	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Nitrate as NO3	Konelab CLS 39	+/- 2 @ 17 mg/l NO3	Yes	No	Yes
Nitrite as NO2	Konelab CLS 37	+/- 5.83 %	Yes	No	Yes
Sodium, dissolved	ICP-MS CLS129	+/- 11.62 %	Yes	No	Yes
Total Phosphorus as P (filtered 0.45um)	Filtration prior to CLS 151	+/- 18.01 %	No	No	Yes
Calcium, dissolved	ICP-MS CLS129	+/-5.5@30mg/l	Yes	No	Yes
Magnesium, total	ICP-MS CLS129	+/-0.74@4mg/l	Yes	No	Yes
Sulphate (SO4)	Konelab CLS 88	+/- 7.29 %	Yes	No	Yes
Manganese, total	ICP-MS CLS129	+/- 14.53 %	Yes	No	Yes
Ammonia as NH3	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Aluminium, Total	ICP-MS CLS129	+/- 11.75 %	Yes	No	Yes
Iron, dissolved	ICP-MS CLS 129	+/- 10.28 %	Yes	No	Yes
Copper, dissolved	ICP-MS CLS 129	+/- 11.28 %	Yes	No	Yes
Lead, dissolved	ICP-MS CLS129	+/-20@100ug/l	Yes	No	Yes
Chromium, dissolved	ICP-MS CLS 129	+/- 8.38 %	Yes	No	Yes
Nickel, dissolved	ICP-MS CLS129	+/- 7.91 %	Yes	No	Yes
Cadmium, dissolved	ICP-MS CLS129	+/- 10.42 %	Yes	No	Yes
Mercury, dissolved	ICP-MS CLS 129	+/- 27.72 %	Yes	No	Yes
Antimony, dissolved	ICP-MS CLS 129	+/- 13.23 %	Yes	No	Yes
Selenium, dissolved	ICP-MS CLS129	+/-0.9@5ug/l	Yes	No	Yes
Zinc, dissolved	ICP-MS CLS 129	+/- 9.38 %	Yes	No	Yes
Potassium, dissolved	ICP-MS CLS129	+/-0.53@5mg/l	Yes	No	Yes
Barium, dissolved	ICP-MS CLS129	+/-33@250ug/l	Yes	No	Yes
Boron, dissolved	ICP-MS CLS129	+/-15@200ug/l	Yes	No	Yes
Vanadium, dissolved	ICP-MS CLS 129	+/- 11.72 %	Yes	No	Yes
Total Coliforms (Filtration) (Environmental Waters)	CLS 16	±2.76 cfu/100ml	Yes	No	Yes
Molybdate Reactive Phosphorus (MRP unfiltered) as PO4-P	Konelab CLS 35	+/- 0.04 @ 0.3 mg/l PO4	Yes	No	Yes
Faecal Coliforms Filtration	CLS 16 based on The Microbiology of Recreational and Environmental Waters 2000	±4.38 cfu/100ml	Yes	No	Yes
Phosphate as P filtered (low level SW or saline)	CLS 205		Yes	No	Yes

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Lab No	Sample ID	Sample Condition on Receipt	Sampling Date
1598401	21-CL-02	Good condition	29/03/2023

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CERTIFICATE OF ANALYSIS

Client : James Kelliher Environmental officer
Kilsaran International Concrete Ltd.
Piercetown
Dunboyne
Co. Meath A86 W820

Report No. : 516175
Date of Receipt : 30/03/2023
Start Date of Analysis : 30/03/2023
Date of Report : 25/04/2023
Order Number :
Sample taken by : Client

Lab No	Sample Description	Test	Ref.	Result	Units
1598403	21-CL-03	TON as N	I,R	<0.1	mg/l
		pH	I,R	7.5	pH Units
		Conductivity @20C	I,R	504	uS/cm
		Ammonia as NH3-N	I,R	0.485	mg/l
		Chloride	I,R	14.4	mg/l
		Ammonium as NH4	I,R	0.625	mg/l
		Nitrate as NO3	I,R	<0.44	mg/l
		Nitrite as NO2	I,R	<0.017	mg/l
		Sodium, dissolved	I,R	16	mg/l
		Total Phosphorus as P (filtered 0.45um)	R	<0.05	mg/l
		Calcium, dissolved	I,R	76	mg/l
		Magnesium, total	I,R	21	mg/l
		Cyanide, total low level (non-DW) WAS018	S	<0.009	mg/l
		Sulphate (SO4)	I,R	27.6	mg/l
		Fluoride (Non-potable) by ISE	S	1.7	mg/l
		Manganese, total	I,R	91	ug/l
		Ammonia as NH3	I,R	0.588	mg/l
		Aluminium, Total	I,R	160	ug/l
		Iron, dissolved	I,R	<10	ug/l
		Copper, dissolved	I,R	<1	ug/l
		Lead, dissolved	I,R	<0.5	ug/l
		Chromium, dissolved	I,R	<0.5	ug/l
		Nickel, dissolved	I,R	<0.5	ug/l
		Cadmium, dissolved	I,R	<0.5	ug/l
		Mercury, dissolved	I,R	<0.05	ug/l
		Antimony, dissolved	I,R	<0.5	ug/l
		Selenium, dissolved	I,R	<0.5	ug/l
		Zinc, dissolved	I,R	<5	ug/l
		Potassium, dissolved	I,R	2	mg/l
		Barium, dissolved	I,R	78	ug/l
		Boron, dissolved	I,R	33	ug/l
		TPH CWG (>C5-C44) Banded- incl. BTEX/MTBE	S	<10	ug/l
		Vanadium, dissolved	I,R	<0.5	ug/l
		Total Coliforms (Filtration) (Environmental Waters)	I,R	0	cfu/100ml
		Sulphide as S	S	<0.01	mg/l
		Molybdate Reactive Phosphorus (MRP unfiltered) as PO4-P	I,R	<0.01	mg/l
		Faecal Coliforms Filtration	I,R	0	cfu/100ml
		Phosphate as P filtered (low level SW or saline)	I,R	<0.003	mg/l
		Cyanide, free (WAS018)	S	<0.008	mg/l

Approved by: Ann Marie Nee

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In-House Test	Specification	Expanded Measurement of Uncertainty	17025	GMP/FDA*	ISO**
TON as N	Konelab CLS 38	+/- 8.51 %	Yes	No	Yes
pH	CLS 26	+/- 0.133 pH units	Yes	No	Yes
Conductivity @20C	CLS 67	+/- 4.92 %	Yes	No	Yes
Ammonia as NH3-N	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Chloride	Konelab CLS 36	+/- 12.10 %	Yes	No	Yes
Ammonium as NH4	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Nitrate as NO3	Konelab CLS 39	+/- 2 @ 17 mg/l NO3	Yes	No	Yes
Nitrite as NO2	Konelab CLS 37	+/- 5.83 %	Yes	No	Yes
Sodium, dissolved	ICP-MS CLS129	+/- 11.62 %	Yes	No	Yes
Total Phosphorus as P (filtered 0.45um)	Filtration prior to CLS 151	+/- 18.01 %	No	No	Yes
Calcium, dissolved	ICP-MS CLS129	+/-5.5@30mg/l	Yes	No	Yes
Magnesium, total	ICP-MS CLS129	+/-0.74@4mg/l	Yes	No	Yes
Sulphate (SO4)	Konelab CLS 88	+/- 7.29 %	Yes	No	Yes
Manganese, total	ICP-MS CLS129	+/- 14.53 %	Yes	No	Yes
Ammonia as NH3	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Aluminium, Total	ICP-MS CLS129	+/- 11.75 %	Yes	No	Yes
Iron, dissolved	ICP-MS CLS 129	+/- 10.28 %	Yes	No	Yes
Copper, dissolved	ICP-MS CLS 129	+/- 11.28 %	Yes	No	Yes
Lead, dissolved	ICP-MS CLS129	+/-20@100ug/l	Yes	No	Yes
Chromium, dissolved	ICP-MS CLS 129	+/- 8.38 %	Yes	No	Yes
Nickel, dissolved	ICP-MS CLS129	+/- 7.91 %	Yes	No	Yes
Cadmium, dissolved	ICP-MS CLS129	+/- 10.42 %	Yes	No	Yes
Mercury, dissolved	ICP-MS CLS 129	+/- 27.72 %	Yes	No	Yes
Antimony, dissolved	ICP-MS CLS 129	+/- 13.23 %	Yes	No	Yes
Selenium, dissolved	ICP-MS CLS129	+/-0.9@5ug/l	Yes	No	Yes
Zinc, dissolved	ICP-MS CLS 129	+/- 9.38 %	Yes	No	Yes
Potassium, dissolved	ICP-MS CLS129	+/-0.53@5mg/l	Yes	No	Yes
Barium, dissolved	ICP-MS CLS129	+/-33@250ug/l	Yes	No	Yes
Boron, dissolved	ICP-MS CLS129	+/-15@200ug/l	Yes	No	Yes
Vanadium, dissolved	ICP-MS CLS 129	+/- 11.72 %	Yes	No	Yes
Total Coliforms (Filtration) (Environmental Waters)	CLS 16	±2.76 cfu/100ml	Yes	No	Yes
Molybdate Reactive Phosphorus (MRP unfiltered) as PO4-P	Konelab CLS 35	+/- 0.04 @ 0.3 mg/l PO4	Yes	No	Yes
Faecal Coliforms Filtration	CLS 16 based on The Microbiology of Recreational and Environmental Waters 2000	±4.38 cfu/100ml	Yes	No	Yes
Phosphate as P filtered (low level SW or saline)	CLS 205		Yes	No	Yes

*Analysis carried out in a GMP approved, FDA inspected facility (MedPharma site only).
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Lab No	Sample ID	Sample Condition on Receipt	Sampling Date
1598403	21-CL-03	Good condition	29/03/2023

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CERTIFICATE OF ANALYSIS

Client : James Kelliher Environmental officer
Kilsaran International Concrete Ltd.
Piercetown
Dunboyne
Co. Meath A86 W820

Report No. : 516177
Date of Receipt : 30/03/2023
Start Date of Analysis : 30/03/2023
Date of Report : 25/04/2023
Order Number :
Sample taken by : Client

Lab No	Sample Description	Test	Ref.	Result	Units
1598407	21-CL-04	TON as N	I,R	0.154	mg/l
		pH	I,R	7.4	pH Units
		Conductivity @20C	I,R	570	uS/cm
		Ammonia as NH3-N	I,R	162	mg/l
		Chloride	I,R	14.8	mg/l
		Ammonium as NH4	I,R	209	mg/l
		Nitrate as NO3	I,R	0.846	mg/l
		Nitrite as NO2	I,R	<0.017	mg/l
		Sodium, dissolved	I,R	4	mg/l
		Total Phosphorus as P (filtered 0.45um)	R	<0.05	mg/l
		Calcium, dissolved	I,R	93	mg/l
		Magnesium, total	I,R	13	mg/l
		Cyanide, total low level (non-DW) WAS018	S	<0.009	mg/l
		Sulphate (SO4)	I,R	412	mg/l
		Fluoride (Non-potable) by ISE	S	0.2	mg/l
		Manganese, total	I,R	1363	ug/l
		Ammonia as NH3	I,R	176	mg/l
		Aluminium, Total	I,R	14714	ug/l
		Iron, dissolved	I,R	<10	ug/l
		Copper, dissolved	I,R	<1	ug/l
		Lead, dissolved	I,R	<0.5	ug/l
		Chromium, dissolved	I,R	<0.5	ug/l
		Nickel, dissolved	I,R	<0.5	ug/l
		Cadmium, dissolved	I,R	<0.5	ug/l
		Mercury, dissolved	I,R	<0.05	ug/l
		Antimony, dissolved	I,R	<0.5	ug/l
		Selenium, dissolved	I,R	1	ug/l
		Zinc, dissolved	I,R	<5	ug/l
		Potassium, dissolved	I,R	<0.5	mg/l
		Barium, dissolved	I,R	16	ug/l
		Boron, dissolved	I,R	<10	ug/l
		TPH CWG (>C5-C44) Banded- incl. BTEX/MTBE	S	<10	ug/l
		Vanadium, dissolved	I,R	<0.5	ug/l
		Total Coliforms (Filtration) (Environmental Waters)	I,R	<100 Result obtained from a 1 in 100 dilution	cfu/100ml
		Sulphide as S	S	<0.01	mg/l
		Molybdate Reactive Phosphorus (MRP unfiltered) as PO4-P	I,R	0.025	mg/l
		Faecal Coliforms Filtration	I,R	<100 Result obtained from a 1 in 100 dilution	cfu/100ml
		Phosphate as P filtered (low level SW or saline)	I,R	<0.003	mg/l
		Cyanide, free (WAS018)	S	<0.008	mg/l

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Approved by:

AnnMarie Nee
Environmental
Services Administrator

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In-House Test	Specification	Expanded Measurement of Uncertainty	17025	GMP/FDA*	ISO**
TON as N	Konelab CLS 38	+/- 8.51 %	Yes	No	Yes
pH	CLS 26	+/- 0.133 pH units	Yes	No	Yes
Conductivity @20C	CLS 67	+/- 4.92 %	Yes	No	Yes
Ammonia as NH3-N	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Chloride	Konelab CLS 36	+/- 12.10 %	Yes	No	Yes
Ammonium as NH4	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Nitrate as NO3	Konelab CLS 39	+/- 2 @ 17 mg/l NO3	Yes	No	Yes
Nitrite as NO2	Konelab CLS 37	+/- 5.83 %	Yes	No	Yes
Sodium, dissolved	ICP-MS CLS129	+/- 11.62 %	Yes	No	Yes
Total Phosphorus as P (filtered 0.45um)	Filtration prior to CLS 151	+/- 18.01 %	No	No	Yes
Calcium, dissolved	ICP-MS CLS129	+/-5.5@30mg/l	Yes	No	Yes
Magnesium, total	ICP-MS CLS129	+/-0.74@4mg/l	Yes	No	Yes
Sulphate (SO4)	Konelab CLS 88	+/- 7.29 %	Yes	No	Yes
Manganese, total	ICP-MS CLS129	+/- 14.53 %	Yes	No	Yes
Ammonia as NH3	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Aluminium, Total	ICP-MS CLS129	+/- 11.75 %	Yes	No	Yes
Iron, dissolved	ICP-MS CLS 129	+/- 10.28 %	Yes	No	Yes
Copper, dissolved	ICP-MS CLS 129	+/- 11.28 %	Yes	No	Yes
Lead, dissolved	ICP-MS CLS129	+/-20@100ug/l	Yes	No	Yes
Chromium, dissolved	ICP-MS CLS 129	+/- 8.38 %	Yes	No	Yes
Nickel, dissolved	ICP-MS CLS129	+/- 7.91 %	Yes	No	Yes
Cadmium, dissolved	ICP-MS CLS129	+/- 10.42 %	Yes	No	Yes
Mercury, dissolved	ICP-MS CLS 129	+/- 27.72 %	Yes	No	Yes
Antimony, dissolved	ICP-MS CLS 129	+/- 13.23 %	Yes	No	Yes
Selenium, dissolved	ICP-MS CLS129	+/-0.9@5ug/l	Yes	No	Yes
Zinc, dissolved	ICP-MS CLS 129	+/- 9.38 %	Yes	No	Yes
Potassium, dissolved	ICP-MS CLS129	+/-0.53@5mg/l	Yes	No	Yes
Barium, dissolved	ICP-MS CLS129	+/-33@250ug/l	Yes	No	Yes
Boron, dissolved	ICP-MS CLS129	+/-15@200ug/l	Yes	No	Yes
Vanadium, dissolved	ICP-MS CLS 129	+/- 11.72 %	Yes	No	Yes
Total Coliforms (Filtration) (Environmental Waters)	CLS 16	±2.76 cfu/100ml	Yes	No	Yes
Molybdate Reactive Phosphorus (MRP unfiltered) as PO4-P	Konelab CLS 35	+/- 0.04 @ 0.3 mg/l PO4	Yes	No	Yes
Faecal Coliforms Filtration	CLS 16 based on The Microbiology of Recreational and Environmental Waters 2000	±4.38 cfu/100ml	Yes	No	Yes
Phosphate as P filtered (low level SW or saline)	CLS 205		Yes	No	Yes

*Analysis carried out in a GMP approved, FDA inspected facility (MedPharma site only).
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Lab No	Sample ID	Sample Condition on Receipt	Sampling Date
1598407	21-CL-04	Good condition	29/03/2023

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CERTIFICATE OF ANALYSIS

Client : James Kelliher Environmental officer
Kilsaran International Concrete Ltd.
Piercetown
Dunboyne
Co. Meath A86 W820

Report No. : 516178
Date of Receipt : 30/03/2023
Start Date of Analysis : 30/03/2023
Date of Report : 25/04/2023
Order Number :
Sample taken by : Client

Lab No	Sample Description	Test	Ref.	Result	Units
1598410	21-CL-05	TON as N	I,R	<0.1	mg/l
		pH	I,R	7.0	pH Units
		Conductivity @20C	I,R	889	uS/cm
		Ammonia as NH3-N	I,R	0.501	mg/l
		Chloride	I,R	57.3	mg/l
		Ammonium as NH4	I,R	0.646	mg/l
		Nitrate as NO3	I,R	<0.44	mg/l
		Nitrite as NO2	I,R	<0.017	mg/l
		Sodium, dissolved	I,R	19	mg/l
		Total Phosphorus as P (filtered 0.45um)	R	<0.05	mg/l
		Calcium, dissolved	I,R	157	mg/l
		Magnesium, total	I,R	16	mg/l
		Cyanide, total low level (non-DW) WAS018	S	<0.009	mg/l
		Sulphate (SO4)	I,R	127	mg/l
		Fluoride (Non-potable) by ISE	S	0.2	mg/l
		Manganese, total	I,R	354	ug/l
		Ammonia as NH3	I,R	0.609	mg/l
		Aluminium, Total	I,R	11	ug/l
		Iron, dissolved	I,R	<10	ug/l
		Copper, dissolved	I,R	<1	ug/l
		Lead, dissolved	I,R	<0.5	ug/l
		Chromium, dissolved	I,R	<0.5	ug/l
		Nickel, dissolved	I,R	<0.5	ug/l
		Cadmium, dissolved	I,R	<0.5	ug/l
		Mercury, dissolved	I,R	<0.05	ug/l
		Antimony, dissolved	I,R	<0.5	ug/l
		Selenium, dissolved	I,R	<0.5	ug/l
		Zinc, dissolved	I,R	<5	ug/l
		Potassium, dissolved	I,R	<0.5	mg/l
		Barium, dissolved	I,R	152	ug/l
		Boron, dissolved	I,R	<10	ug/l
		TPH CWG (>C5-C44) Banded- incl. BTEX/MTBE	S	<10	ug/l
		Vanadium, dissolved	I,R	<0.5	ug/l
		Total Coliforms (Filtration) (Environmental Waters)	I,R	0	cfu/100ml
		Sulphide as S	S	<0.01	mg/l
		Molybdate Reactive Phosphorus (MRP unfiltered) as PO4-P	I,R	<0.01	mg/l
		Faecal Coliforms Filtration	I,R	0	cfu/100ml
		Phosphate as P filtered (low level SW or saline)	I,R	<0.003	mg/l
		Cyanide, free (WAS018)	S	<0.008	mg/l

ISO 17025

Approved by: Ann Marie Nee

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AnnMarie Nee
Environmental
Services Administrator

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In-House Test	Specification	Expanded Measurement of Uncertainty	17025	GMP/FDA*	ISO**
TON as N	Konelab CLS 38	+/- 8.51 %	Yes	No	Yes
pH	CLS 26	+/- 0.133 pH units	Yes	No	Yes
Conductivity @20C	CLS 67	+/- 4.92 %	Yes	No	Yes
Ammonia as NH3-N	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Chloride	Konelab CLS 36	+/- 12.10 %	Yes	No	Yes
Ammonium as NH4	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Nitrate as NO3	Konelab CLS 39	+/- 2 @ 17 mg/l NO3	Yes	No	Yes
Nitrite as NO2	Konelab CLS 37	+/- 5.83 %	Yes	No	Yes
Sodium, dissolved	ICP-MS CLS129	+/- 11.62 %	Yes	No	Yes
Total Phosphorus as P (filtered 0.45um)	Filtration prior to CLS 151	+/- 18.01 %	No	No	Yes
Calcium, dissolved	ICP-MS CLS129	+/-5.5@30mg/l	Yes	No	Yes
Magnesium, total	ICP-MS CLS129	+/-0.74@4mg/l	Yes	No	Yes
Sulphate (SO4)	Konelab CLS 88	+/- 7.29 %	Yes	No	Yes
Manganese, total	ICP-MS CLS129	+/- 14.53 %	Yes	No	Yes
Ammonia as NH3	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Aluminium, Total	ICP-MS CLS129	+/- 11.75 %	Yes	No	Yes
Iron, dissolved	ICP-MS CLS 129	+/- 10.28 %	Yes	No	Yes
Copper, dissolved	ICP-MS CLS 129	+/- 11.28 %	Yes	No	Yes
Lead, dissolved	ICP-MS CLS129	+/-20@100ug/l	Yes	No	Yes
Chromium, dissolved	ICP-MS CLS 129	+/- 8.38 %	Yes	No	Yes
Nickel, dissolved	ICP-MS CLS129	+/- 7.91 %	Yes	No	Yes
Cadmium, dissolved	ICP-MS CLS129	+/- 10.42 %	Yes	No	Yes
Mercury, dissolved	ICP-MS CLS 129	+/- 27.72 %	Yes	No	Yes
Antimony, dissolved	ICP-MS CLS 129	+/- 13.23 %	Yes	No	Yes
Selenium, dissolved	ICP-MS CLS129	+/-0.9@5ug/l	Yes	No	Yes
Zinc, dissolved	ICP-MS CLS 129	+/- 9.38 %	Yes	No	Yes
Potassium, dissolved	ICP-MS CLS129	+/-0.53@5mg/l	Yes	No	Yes
Barium, dissolved	ICP-MS CLS129	+/-33@250ug/l	Yes	No	Yes
Boron, dissolved	ICP-MS CLS129	+/-15@200ug/l	Yes	No	Yes
Vanadium, dissolved	ICP-MS CLS 129	+/- 11.72 %	Yes	No	Yes
Total Coliforms (Filtration) (Environmental Waters)	CLS 16	±2.76 cfu/100ml	Yes	No	Yes
Molybdate Reactive Phosphorus (MRP unfiltered) as PO4-P	Konelab CLS 35	+/- 0.04 @ 0.3 mg/l PO4	Yes	No	Yes
Faecal Coliforms Filtration	CLS 16 based on The Microbiology of Recreational and Environmental Waters 2000	±4.38 cfu/100ml	Yes	No	Yes
Phosphate as P filtered (low level SW or saline)	CLS 205		Yes	No	Yes

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Lab No	Sample ID	Sample Condition on Receipt	Sampling Date
1598410	21-CL-05	Good condition	29/03/2023

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CERTIFICATE OF ANALYSIS

Client : James Kelliher Environmental officer
Kilsaran International Concrete Ltd.
Piercetown
Dunboyne
Co. Meath A86 W820

Report No. : 516179
Date of Receipt : 30/03/2023
Start Date of Analysis : 30/03/2023
Date of Report : 25/04/2023
Order Number :
Sample taken by : Client

Lab No	Sample Description	Test	Ref.	Result	Units
1598414	21-CL-06	TON as N	I,R	2.68	mg/l
		pH	I,R	7.1	pH Units
		Conductivity @20C	I,R	686	uS/cm
		Ammonia as NH3-N	I,R	0.013	mg/l
		Chloride	I,R	13	mg/l
		Ammonium as NH4	I,R	0.016	mg/l
		Nitrate as NO3	I,R	11.8	mg/l
		Nitrite as NO2	I,R	<0.017	mg/l
		Sodium, dissolved	I,R	7	mg/l
		Total Phosphorus as P (filtered 0.45um)	R	<0.05	mg/l
		Calcium, dissolved	I,R	142	mg/l
		Magnesium, total	I,R	8	mg/l
		Cyanide, total low level (non-DW) WAS018	S	<0.009	mg/l
		Sulphate (SO4)	I,R	11	mg/l
		Fluoride (Non-potable) by ISE	S	0.2	mg/l
		Manganese, total	I,R	59	ug/l
		Ammonia as NH3	I,R	0.015	mg/l
		Aluminium, Total	I,R	154	ug/l
		Iron, dissolved	I,R	<10	ug/l
		Copper, dissolved	I,R	<1	ug/l
		Lead, dissolved	I,R	<0.5	ug/l
		Chromium, dissolved	I,R	<0.5	ug/l
		Nickel, dissolved	I,R	<0.5	ug/l
		Cadmium, dissolved	I,R	<0.5	ug/l
		Mercury, dissolved	I,R	<0.05	ug/l
		Antimony, dissolved	I,R	<0.5	ug/l
		Selenium, dissolved	I,R	2	ug/l
		Zinc, dissolved	I,R	<5	ug/l
		Potassium, dissolved	I,R	1	mg/l
		Barium, dissolved	I,R	50	ug/l
		Boron, dissolved	I,R	11	ug/l
		TPH CWG (>C5-C44) Banded- incl. BTEX/MTBE	S	<10	ug/l
		Vanadium, dissolved	I,R	<0.5	ug/l
		Total Coliforms (Filtration) (Environmental Waters)	I,R	15	cfu/100ml
		Sulphide as S	S	<0.01	mg/l
		Molybdate Reactive Phosphorus (MRP unfiltered) as PO4-P	I,R	<0.01	mg/l
		Faecal Coliforms Filtration	I,R	12	cfu/100ml
		Phosphate as P filtered (low level SW or saline)	I,R	<0.003	mg/l
		Cyanide, free (WAS018)	S	<0.008	mg/l

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TON as N	Konelab CLS 38	+/- 8.51 %	Yes	No	Yes
pH	CLS 26	+/- 0.133 pH units	Yes	No	Yes
Conductivity @20C	CLS 67	+/- 4.92 %	Yes	No	Yes
Ammonia as NH3-N	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Chloride	Konelab CLS 36	+/- 12.10 %	Yes	No	Yes
Ammonium as NH4	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Nitrate as NO3	Konelab CLS 39	+/- 2 @ 17 mg/l NO3	Yes	No	Yes
Nitrite as NO2	Konelab CLS 37	+/- 5.83 %	Yes	No	Yes
Sodium, dissolved	ICP-MS CLS129	+/- 11.62 %	Yes	No	Yes
Total Phosphorus as P (filtered 0.45um)	Filtration prior to CLS 151	+/- 18.01 %	No	No	Yes
Calcium, dissolved	ICP-MS CLS129	+/-5.5@30mg/l	Yes	No	Yes
Magnesium, total	ICP-MS CLS129	+/-0.74@4mg/l	Yes	No	Yes
Sulphate (SO4)	Konelab CLS 88	+/- 7.29 %	Yes	No	Yes
Manganese, total	ICP-MS CLS129	+/- 14.53 %	Yes	No	Yes
Ammonia as NH3	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Aluminium, Total	ICP-MS CLS129	+/- 11.75 %	Yes	No	Yes
Iron, dissolved	ICP-MS CLS 129	+/- 10.28 %	Yes	No	Yes
Copper, dissolved	ICP-MS CLS 129	+/- 11.28 %	Yes	No	Yes
Lead, dissolved	ICP-MS CLS129	+/-20@100ug/l	Yes	No	Yes
Chromium, dissolved	ICP-MS CLS 129	+/- 8.38 %	Yes	No	Yes
Nickel, dissolved	ICP-MS CLS129	+/- 7.91 %	Yes	No	Yes
Cadmium, dissolved	ICP-MS CLS129	+/- 10.42 %	Yes	No	Yes
Mercury, dissolved	ICP-MS CLS 129	+/- 27.72 %	Yes	No	Yes
Antimony, dissolved	ICP-MS CLS 129	+/- 13.23 %	Yes	No	Yes
Selenium, dissolved	ICP-MS CLS129	+/-0.9@5ug/l	Yes	No	Yes
Zinc, dissolved	ICP-MS CLS 129	+/- 9.38 %	Yes	No	Yes
Potassium, dissolved	ICP-MS CLS129	+/-0.53@5mg/l	Yes	No	Yes
Barium, dissolved	ICP-MS CLS129	+/-33@250ug/l	Yes	No	Yes
Boron, dissolved	ICP-MS CLS129	+/-15@200ug/l	Yes	No	Yes
Vanadium, dissolved	ICP-MS CLS 129	+/- 11.72 %	Yes	No	Yes
Total Coliforms (Filtration) (Environmental Waters)	CLS 16	±2.76 cfu/100ml	Yes	No	Yes
Molybdate Reactive Phosphorus (MRP unfiltered) as PO4-P	Konelab CLS 35	+/- 0.04 @ 0.3 mg/l PO4	Yes	No	Yes
Faecal Coliforms Filtration	CLS 16 based on The Microbiology of Recreational and Environmental Waters 2000	±4.38 cfu/100ml	Yes	No	Yes
Phosphate as P filtered (low level SW or saline)	CLS 205		Yes	No	Yes

*Analysis carried out in a GMP approved, FDA inspected facility (MedPharma site only).
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Lab No	Sample ID	Sample Condition on Receipt	Sampling Date
1598414	21-CL-06	Good condition	29/03/2023

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Symbol Reference - I:17025 accredited; S:Subcontracted; R:Analysis carried out in Ros Muc; M:Analysis carried out in MedPharma; F:Field test; O:Tested outside hold time.

Complete Laboratory Solutions
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CERTIFICATE OF ANALYSIS

Client : James Kelliher Environmental officer
Kilsaran International Concrete Ltd.
Piercetown
Dunboyne
Co. Meath A86 W820

Report No. : 516180
Date of Receipt : 30/03/2023
Start Date of Analysis : 30/03/2023
Date of Report : 25/04/2023
Order Number :
Sample taken by : Client

Lab No	Sample Description	Test	Ref.	Result	Units
1598416	W3	TON as N	I,R	5.42	mg/l
		pH	I,R	7.7	pH Units
		Conductivity @20C	I,R	471	uS/cm
		Ammonia as NH3-N	I,R	0.084	mg/l
		Chloride	I,R	15.8	mg/l
		Ammonium as NH4	I,R	0.108	mg/l
		Nitrate as NO3	I,R	23.9	mg/l
		Nitrite as NO2	I,R	<0.017	mg/l
		Sodium, dissolved	I,R	9	mg/l
		Total Phosphorus as P (filtered 0.45um)	R	<0.05	mg/l
		Calcium, dissolved	I,R	73	mg/l
		Magnesium, total	I,R	11	mg/l
		Cyanide, total low level (non-DW) WAS018	S	<0.009	mg/l
		Sulphate (SO4)	I,R	35.4	mg/l
		Fluoride (Non-potable) by ISE	S	0.3	mg/l
		Manganese, total	I,R	<5	ug/l
		Ammonia as NH3	I,R	0.11	mg/l
		Aluminium, Total	I,R	20	ug/l
		Iron, dissolved	I,R	<10	ug/l
		Copper, dissolved	I,R	<1	ug/l
		Lead, dissolved	I,R	<0.5	ug/l
		Chromium, dissolved	I,R	3	ug/l
		Nickel, dissolved	I,R	<0.5	ug/l
		Cadmium, dissolved	I,R	<0.5	ug/l
		Mercury, dissolved	I,R	<0.05	ug/l
		Antimony, dissolved	I,R	<0.5	ug/l
		Selenium, dissolved	I,R	1	ug/l
		Zinc, dissolved	I,R	<5	ug/l
		Potassium, dissolved	I,R	3	mg/l
		Barium, dissolved	I,R	27	ug/l
		Boron, dissolved	I,R	<10	ug/l
		TPH CWG (>C5-C44) Banded- incl. BTEX/MTBE	S	<10	ug/l
		Vanadium, dissolved	I,R	<0.5	ug/l
		Total Coliforms (Filtration) (Environmental Waters)	I,R	0	cfu/100ml
		Sulphide as S	S	<0.01	mg/l
		Molybdate Reactive Phosphorus (MRP unfiltered) as PO4-P	I,R	<0.01	mg/l
		Faecal Coliforms Filtration	I,R	0	cfu/100ml
		Phosphate as P filtered (low level SW or saline)	I,R	0.015	mg/l
		Cyanide, free (WAS018)	S	<0.008	mg/l

Approved by: Ann Marie Nee

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AnnMarie Nee
Environmental
Services Administrator

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In-House Test	Specification	Expanded Measurement of Uncertainty	17025	GMP/FDA*	ISO**
TON as N	Konelab CLS 38	+/- 8.51 %	Yes	No	Yes
pH	CLS 26	+/- 0.133 pH units	Yes	No	Yes
Conductivity @20C	CLS 67	+/- 4.92 %	Yes	No	Yes
Ammonia as NH3-N	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Chloride	Konelab CLS 36	+/- 12.10 %	Yes	No	Yes
Ammonium as NH4	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Nitrate as NO3	Konelab CLS 39	+/- 2 @ 17 mg/l NO3	Yes	No	Yes
Nitrite as NO2	Konelab CLS 37	+/- 5.83 %	Yes	No	Yes
Sodium, dissolved	ICP-MS CLS129	+/- 11.62 %	Yes	No	Yes
Total Phosphorus as P (filtered 0.45um)	Filtration prior to CLS 151	+/- 18.01 %	No	No	Yes
Calcium, dissolved	ICP-MS CLS129	+/-5.5@30mg/l	Yes	No	Yes
Magnesium, total	ICP-MS CLS129	+/-0.74@4mg/l	Yes	No	Yes
Sulphate (SO4)	Konelab CLS 88	+/- 7.29 %	Yes	No	Yes
Manganese, total	ICP-MS CLS129	+/- 14.53 %	Yes	No	Yes
Ammonia as NH3	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Aluminium, Total	ICP-MS CLS129	+/- 11.75 %	Yes	No	Yes
Iron, dissolved	ICP-MS CLS 129	+/- 10.28 %	Yes	No	Yes
Copper, dissolved	ICP-MS CLS 129	+/- 11.28 %	Yes	No	Yes
Lead, dissolved	ICP-MS CLS129	+/-20@100ug/l	Yes	No	Yes
Chromium, dissolved	ICP-MS CLS 129	+/- 8.38 %	Yes	No	Yes
Nickel, dissolved	ICP-MS CLS129	+/- 7.91 %	Yes	No	Yes
Cadmium, dissolved	ICP-MS CLS129	+/- 10.42 %	Yes	No	Yes
Mercury, dissolved	ICP-MS CLS 129	+/- 27.72 %	Yes	No	Yes
Antimony, dissolved	ICP-MS CLS 129	+/- 13.23 %	Yes	No	Yes
Selenium, dissolved	ICP-MS CLS129	+/-0.9@5ug/l	Yes	No	Yes
Zinc, dissolved	ICP-MS CLS 129	+/- 9.38 %	Yes	No	Yes
Potassium, dissolved	ICP-MS CLS129	+/-0.53@5mg/l	Yes	No	Yes
Barium, dissolved	ICP-MS CLS129	+/-33@250ug/l	Yes	No	Yes
Boron, dissolved	ICP-MS CLS129	+/-15@200ug/l	Yes	No	Yes
Vanadium, dissolved	ICP-MS CLS 129	+/- 11.72 %	Yes	No	Yes
Total Coliforms (Filtration) (Environmental Waters)	CLS 16	±2.76 cfu/100ml	Yes	No	Yes
Molybdate Reactive Phosphorus (MRP unfiltered) as PO4-P	Konelab CLS 35	+/- 0.04 @ 0.3 mg/l PO4	Yes	No	Yes
Faecal Coliforms Filtration	CLS 16 based on The Microbiology of Recreational and Environmental Waters 2000	±4.38 cfu/100ml	Yes	No	Yes
Phosphate as P filtered (low level SW or saline)	CLS 205		Yes	No	Yes

*Analysis carried out in a GMP approved, FDA inspected facility (MedPharma site only).
**Laboratory Analysis, Sampling, Food Safety Monitoring and Analysts on Contract are all ISO 9001 certified.

Lab No	Sample ID	Sample Condition on Receipt	Sampling Date
1598416	W3	Good condition	29/03/2023

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CERTIFICATE OF ANALYSIS

Client : James Kelliher Environmental officer
Kilsaran International Concrete Ltd.
Piercetown
Dunboyne
Co. Meath A86 W820

Report No. : 516181
Date of Receipt : 30/03/2023
Start Date of Analysis : 30/03/2023
Date of Report : 25/04/2023
Order Number :
Sample taken by : Client

Lab No	Sample Description	Test	Ref.	Result	Units
1598428	SW1	BOD	I,R	<1	mg/l
		Suspended Solids	I,R	4	mg/l
		TON as N	I,R	3.44	mg/l
		COD	I,R	113	mg/l
		pH	I,R	7.7	pH Units
		Conductivity @20C	I,R	619	uS/cm
		Ammonia as NH3-N	I,R	<0.005	mg/l
		Chloride	I,R	14.9	mg/l
		Ammonium as NH4	I,R	<0.01	mg/l
		Nitrate as NO3	I,R	14.4	mg/l
		Nitrite as NO2	I,R	0.031	mg/l
		Dissolved Oxygen (%)	F,R	93.9	%Sat
		Sodium, dissolved	I,R	8	mg/l
		Total Phosphorus as P (filtered 0.45um)	R	<0.05	mg/l
		Calcium, dissolved	I,R	125	mg/l
		Magnesium, total	I,R	7	mg/l
		Cyanide, total low level (non-DW) WAS018	S	<0.009	mg/l
		Sulphate (SO4)	I,R	33.1	mg/l
		Fluoride (Non-potable) by ISE	S	0.3	mg/l
		Manganese, total	I,R	44	ug/l
		Ammonia as NH3	I,R	<0.006	mg/l
		Aluminium, Total	I,R	71	ug/l
		Iron, dissolved	I,R	71	ug/l
		Copper, dissolved	I,R	2	ug/l
		Lead, dissolved	I,R	<0.5	ug/l
		Chromium, dissolved	I,R	<0.5	ug/l
		Nickel, dissolved	I,R	3	ug/l
		Cadmium, dissolved	I,R	<0.5	ug/l
		Mercury, dissolved	I,R	<0.05	ug/l
		Antimony, dissolved	I,R	<0.5	ug/l
		Selenium, dissolved	I,R	2	ug/l
		Zinc, dissolved	I,R	<5	ug/l
		Potassium, dissolved	I,R	1	mg/l
		Barium, dissolved	I,R	52	ug/l
		Boron, dissolved	I,R	10	ug/l
		TPH CWG (>C5-C44) Banded- incl. BTEX/MTBE	S	<10	ug/l
		Vanadium, dissolved	I,R	1	ug/l
		Total Coliforms (Filtration) (Environmental Waters)	I,R	42	cfu/100ml
		Sulphide as S	S	<0.01	mg/l
		Molybdate Reactive Phosphorus (MRP unfiltered) as PO4-P	I,R	0.011	mg/l
		Faecal Coliforms Filtration	I,R	35	cfu/100ml
		Phosphate as P filtered (low level SW or saline)	I,R	0.024	mg/l
		Cyanide, free (WAS018)	S	<0.008	mg/l

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Approved by:

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Environmental
Services Administrator

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In-House Test	Specification	Expanded Measurement of Uncertainty	17025	GMP/FDA*	ISO**
BOD	CLS 12	+/- 9.33 %	Yes	No	Yes
Suspended Solids	CLS 13	+/- 20.84 %	Yes	No	Yes
TON as N	Konelab CLS 38	+/- 8.51 %	Yes	No	Yes
COD	CLS 52	+/- 4.48 %	Yes	No	Yes
pH	CLS 26	+/- 0.133 pH units	Yes	No	Yes
Conductivity @20C	CLS 67	+/- 4.92 %	Yes	No	Yes
Ammonia as NH3-N	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Chloride	Konelab CLS 36	+/- 12.10 %	Yes	No	Yes
Ammonium as NH4	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Nitrate as NO3	Konelab CLS 39	+/- 2 @ 17 mg/l NO3	Yes	No	Yes
Nitrite as NO2	Konelab CLS 37	+/- 5.83 %	Yes	No	Yes
Dissolved Oxygen (%)	CLS 75	0	No	No	Yes
Sodium, dissolved	ICP-MS CLS129	+/- 11.62 %	Yes	No	Yes
Total Phosphorus as P (filtered 0.45um)	Filtration prior to CLS 151	+/- 18.01 %	No	No	Yes
Calcium, dissolved	ICP-MS CLS129	+/-5.5@30mg/l	Yes	No	Yes
Magnesium, total	ICP-MS CLS129	+/-0.74@4mg/l	Yes	No	Yes
Sulphate (SO4)	Konelab CLS 88	+/- 7.29 %	Yes	No	Yes
Manganese, total	ICP-MS CLS129	+/- 14.53 %	Yes	No	Yes
Ammonia as NH3	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Aluminium, Total	ICP-MS CLS129	+/- 11.75 %	Yes	No	Yes
Iron, dissolved	ICP-MS CLS 129	+/- 10.28 %	Yes	No	Yes
Copper, dissolved	ICP-MS CLS 129	+/- 11.28 %	Yes	No	Yes
Lead, dissolved	ICP-MS CLS129	+/-20@100ug/l	Yes	No	Yes
Chromium, dissolved	ICP-MS CLS 129	+/- 8.38 %	Yes	No	Yes
Nickel, dissolved	ICP-MS CLS129	+/- 7.91 %	Yes	No	Yes
Cadmium, dissolved	ICP-MS CLS129	+/- 10.42 %	Yes	No	Yes
Mercury, dissolved	ICP-MS CLS 129	+/- 27.72 %	Yes	No	Yes
Antimony, dissolved	ICP-MS CLS 129	+/- 13.23 %	Yes	No	Yes
Selenium, dissolved	ICP-MS CLS129	+/-0.9@5ug/l	Yes	No	Yes
Zinc, dissolved	ICP-MS CLS 129	+/- 9.38 %	Yes	No	Yes
Potassium, dissolved	ICP-MS CLS129	+/-0.53@5mg/l	Yes	No	Yes
Barium, dissolved	ICP-MS CLS129	+/-33@250ug/l	Yes	No	Yes
Boron, dissolved	ICP-MS CLS129	+/-15@200ug/l	Yes	No	Yes
Vanadium, dissolved	ICP-MS CLS 129	+/- 11.72 %	Yes	No	Yes
Total Coliforms (Filtration) (Environmental Waters)	CLS 16	±2.76 cfu/100ml	Yes	No	Yes
Molybdate Reactive Phosphorus (MRP unfiltered) as PO4-P	Konelab CLS 35	+/- 0.04 @ 0.3 mg/l PO4	Yes	No	Yes
Faecal Coliforms Filtration	CLS 16 based on The Microbiology of Recreational and Environmental Waters 2000	±4.38 cfu/100ml	Yes	No	Yes
Phosphate as P filtered (low level SW or saline)	CLS 205		Yes	No	Yes

*Analysis carried out in a GMP approved, FDA inspected facility (MedPharma site only).
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Lab No	Sample ID	Sample Condition on Receipt	Sampling Date
1598428	SW1	Good condition	29/03/2023

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CERTIFICATE OF ANALYSIS

Client : James Kelliher Environmental officer
Kilsaran International Concrete Ltd.
Piercetown
Dunboyne
Co. Meath A86 W820

Report No. : 516182
Date of Receipt : 30/03/2023
Start Date of Analysis : 30/03/2023
Date of Report : 21/04/2023
Order Number :
Sample taken by : Client

Lab No	Sample Description	Test	Ref.	Result	Units
1598432	SW2	BOD	I,R	1	mg/l
		Suspended Solids	I,R	<2	mg/l
		TON as N	I,R	2.78	mg/l
		COD	I,R	116	mg/l
		pH	I,R	7.9	pH Units
		Conductivity @20C	I,R	667	uS/cm
		Ammonia as NH3-N	I,R	<0.005	mg/l
		Chloride	I,R	17.8	mg/l
		Ammonium as NH4	I,R	<0.01	mg/l
		Nitrate as NO3	I,R	12.2	mg/l
		Nitrite as NO2	I,R	0.069	mg/l
		Dissolved Oxygen (%)	F,R	92.9	%Sat
		Sodium, dissolved	I,R	9	mg/l
		Total Phosphorus as P (filtered 0.45um)	R	<0.05	mg/l
		Calcium, dissolved	I,R	135	mg/l
		Magnesium, total	I,R	8	mg/l
		Cyanide, total low level (non-DW) WAS018	S	<0.009	mg/l
		Sulphate (SO4)	I,R	40.5	mg/l
		Fluoride (Non-potable) by ISE	S	0.3	mg/l
		Manganese, total	I,R	67	ug/l
		Ammonia as NH3	I,R	<0.006	mg/l
		Aluminium, Total	I,R	53	ug/l
		Iron, dissolved	I,R	84	ug/l
		Copper, dissolved	I,R	<1	ug/l
		Lead, dissolved	I,R	<0.5	ug/l
		Chromium, dissolved	I,R	<0.5	ug/l
		Nickel, dissolved	I,R	4	ug/l
		Cadmium, dissolved	I,R	<0.5	ug/l
		Mercury, dissolved	I,R	<0.05	ug/l
		Antimony, dissolved	I,R	<0.5	ug/l
		Selenium, dissolved	I,R	1	ug/l
		Zinc, dissolved	I,R	<5	ug/l
		Potassium, dissolved	I,R	2	mg/l
		Barium, dissolved	I,R	82	ug/l
		Boron, dissolved	I,R	12	ug/l
		TPH CWG (>C5-C44) Banded- incl. BTEX/MTBE	S	<10	ug/l
		Vanadium, dissolved	I,R	<0.5	ug/l
		Total Coliforms (Filtration) (Environmental Waters)	I,R	100 est	cfu/100ml
		Sulphide as S	S	<0.01	mg/l
		Molybdate Reactive Phosphorus (MRP unfiltered) as PO4-P	I,R	0.032	mg/l
		Faecal Coliforms Filtration	I,R	100 est	cfu/100ml
		Phosphate as P filtered (low level SW or saline)	I,R	0.022	mg/l
		Cyanide, free (WAS018)	S	<0.008	mg/l

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In-House Test	Specification	Expanded Measurement of Uncertainty	17025	GMP/FDA*	ISO**
BOD	CLS 12	+/- 9.33 %	Yes	No	Yes
Suspended Solids	CLS 13	+/- 20.84 %	Yes	No	Yes
TON as N	Konelab CLS 38	+/- 8.51 %	Yes	No	Yes
COD	CLS 52	+/- 4.48 %	Yes	No	Yes
pH	CLS 26	+/- 0.133 pH units	Yes	No	Yes
Conductivity @20C	CLS 67	+/- 4.92 %	Yes	No	Yes
Ammonia as NH3-N	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Chloride	Konelab CLS 36	+/- 12.10 %	Yes	No	Yes
Ammonium as NH4	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Nitrate as NO3	Konelab CLS 39	+/- 2 @ 17 mg/l NO3	Yes	No	Yes
Nitrite as NO2	Konelab CLS 37	+/- 5.83 %	Yes	No	Yes
Dissolved Oxygen (%)	CLS 75	0	No	No	Yes
Sodium, dissolved	ICP-MS CLS129	+/- 11.62 %	Yes	No	Yes
Total Phosphorus as P (filtered 0.45um)	Filtration prior to CLS 151	+/- 18.01 %	No	No	Yes
Calcium, dissolved	ICP-MS CLS129	+/-5.5@30mg/l	Yes	No	Yes
Magnesium, total	ICP-MS CLS129	+/-0.74@4mg/l	Yes	No	Yes
Sulphate (SO4)	Konelab CLS 88	+/- 7.29 %	Yes	No	Yes
Manganese, total	ICP-MS CLS129	+/- 14.53 %	Yes	No	Yes
Ammonia as NH3	Konelab CLS 40	+/- 5.13 %	Yes	No	Yes
Aluminium, Total	ICP-MS CLS129	+/- 11.75 %	Yes	No	Yes
Iron, dissolved	ICP-MS CLS 129	+/- 10.28 %	Yes	No	Yes
Copper, dissolved	ICP-MS CLS 129	+/- 11.28 %	Yes	No	Yes
Lead, dissolved	ICP-MS CLS129	+/-20@100ug/l	Yes	No	Yes
Chromium, dissolved	ICP-MS CLS 129	+/- 8.38 %	Yes	No	Yes
Nickel, dissolved	ICP-MS CLS129	+/- 7.91 %	Yes	No	Yes
Cadmium, dissolved	ICP-MS CLS129	+/- 10.42 %	Yes	No	Yes
Mercury, dissolved	ICP-MS CLS 129	+/- 27.72 %	Yes	No	Yes
Antimony, dissolved	ICP-MS CLS 129	+/- 13.23 %	Yes	No	Yes
Selenium, dissolved	ICP-MS CLS129	+/-0.9@5ug/l	Yes	No	Yes
Zinc, dissolved	ICP-MS CLS 129	+/- 9.38 %	Yes	No	Yes
Potassium, dissolved	ICP-MS CLS129	+/-0.53@5mg/l	Yes	No	Yes
Barium, dissolved	ICP-MS CLS129	+/-33@250ug/l	Yes	No	Yes
Boron, dissolved	ICP-MS CLS129	+/-15@200ug/l	Yes	No	Yes
Vanadium, dissolved	ICP-MS CLS 129	+/- 11.72 %	Yes	No	Yes
Total Coliforms (Filtration) (Environmental Waters)	CLS 16	±2.76 cfu/100ml	Yes	No	Yes
Molybdate Reactive Phosphorus (MRP unfiltered) as PO4-P	Konelab CLS 35	+/- 0.04 @ 0.3 mg/l PO4	Yes	No	Yes
Faecal Coliforms Filtration	CLS 16 based on The Microbiology of Recreational and Environmental Waters 2000	±4.38 cfu/100ml	Yes	No	Yes
Phosphate as P filtered (low level SW or saline)	CLS 205		Yes	No	Yes

*Analysis carried out in a GMP approved, FDA inspected facility (MedPharma site only).
**Laboratory Analysis, Sampling, Food Safety Monitoring and Analysts on Contract are all ISO 9001 certified.

Lab No	Sample ID	Sample Condition on Receipt	Sampling Date
1598432	SW2	Good condition	29/03/2023

Complete Laboratory Solutions,
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Co. Galway

Complete Laboratory Solutions (Medpharma),
Unit 3A & Unit 8,
Small Business Park,
Tuam Road, Galway.

Symbol Reference - I:17025 accredited; S:Subcontracted; R:Analysis carried out in Ros Muc; M:Analysis carried out in MedPharma; F:Field test; O:Tested outside hold time.

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Appendix 7-I
Groundwater Sampling Field Record Sheets

GROUNDWATER SAMPLING FIELD RECORD SHEET

Site location: Kilsaran Clonard, Co Meath
SLR job number: 501.00036.00105 **Date:** 13&14/10/21
Time: 13th 09:30 – 17:00 on site, 14th 07:45 – 09:00 on site
Staff: Jake Shiel
Equipment: Wattera, Bailer, YSI, Tubing

	21-CL-01	21-CL-02	21-CL-03	21-CL-04	21-CL-05	21-CL-06	W3
Groundwater level (m bcl)	18.37	13.17	1.87	4.66	11.56	8.34	3.76
Total depth (m)	60	53.4	40	6.8*	14.73*	17.01*	45.1
Volume of water in borehole (litres)	229	221	210	13.5	19.5	49	-
Waterra/bailer	Waterra	Waterra	Waterra	Bailer	Waterra	Waterra	Bailer

* - see observations

Temperature (°C)	10.2	10.1	10.7	10.2	9.8	10.2	8.9
Dissolved oxygen (%)	10.2	10.1	7.20	55.1	18.4	44.4	52.2
Dissolved oxygen (mg/l)	1.15	1.16	6.80	6.10	2.08	4.99	6.05

	21-CL-01	21-CL-02	21-CL-03	21-CL-04	21-CL-05	21-CL-06	W3
Specific conductivity (µS/cm)	743	663.6	539.1	225.9	981	715	
Conductivity (µS/cm)	532	474.6	391.4	164.0	694	513	
pH	7.09	7.16	7.55	7.10	7.13	7.13	7.49
pHmv	-37.8	41.6	-63.0	-38.7	-40.2	-39.9	-59.6

Odour	No	No	Yes	No	No	No	No
Sheen	No	No	No	Yes	No	No	No
Silt	No	No	No	V High	Minor	Medium	No
Colour	Translucent	Transparent	Transparent	Brown	Transparent	Cloudy	Transparent
Free product	No	No	No	No	No	No	No

Well purged dry	No	No	No	No	No	No	No

Any other field observations:

21-CL-02: Pump filled with petrol over 100m away.

21-CL-04: Borehole listed as 17.1m deep however depth was tested using a dip meter and found to be 7.1m below the top of casing. After bailing the depth was recorded again at 6.3m below the top of casing and water level had dropped to 5.2m below the top of casing. A grab sample was taken with the bailer. Samples had a very high silt content.

21-CL-03: Pump filled with petrol over 20m away.

21-CL-05: Borehole listed as 21.9m deep however depth was tested using a dip meter and found to be 15.1m below the top of casing. Pump filled with petrol over 100m away.

21-CL-06: Borehole listed as 20.5m deep however depth was tested using a dip meter and found to be 17.3m below the top of casing.

W3: Borehole used to supply water to the Ready-mix plant. The borehole was too wide to use the waterra and tubing. As a result, a grab sample was taken with a bailer. The bailer had added weights attached to get the bailer as deep as possible.

ONE WELL VOLUME (50mm diameter casing)	BS 10175
Terrier Borehole with 50mm Pipe	4l/m
6" Borehole with 50mm Pipe	5.5l/m
6" Borehole with 100mm Pipe	11.5l/m
8" Borehole with 50mm Pipe	8.25l/m
8" Borehole with 100mm Pipe	14.25l/m
Note : *Purging should continue until Removal of at least three well volumes, or pH, conductivity and temperature readings have stabilised (any two successive reading are within 10% of eachother). If well is not recovering and it is not possible to meet these criteria then a grab sample should be obtained.*	

Appendix 7-J
Rating of Existing Environment Significance / Sensitivity

Rating of Existing Environment Significance / Sensitivity (IGI, 2013 Guidelines)

Importance	Criteria	Typical Example
High	Attribute has a high quality or value on an international scale	Groundwater/ Surface Water supports river, wetland or surface water body ecosystem protected by EU legislation e.g. SAC or SPA status
	Attribute has a high quality or value on a regional or national scale	Regionally Important Aquifer with multiple wellfields. Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – e.g. NHA status. Regionally important potable water source supplying >2,500 homes Inner source protection area for regionally important water source. Drinking water supply from river. Amenity use of waterbody
	Attribute has a high quality or value on a local scale	Regionally Important Aquifer. Groundwater provides large proportion of baseflow to local rivers. Locally important potable water source supplying >1000 homes. Outer source protection area for regionally important water source. Inner source protection area for locally important water source.
Medium	Attribute has a medium quality or value on a local scale	Locally Important Aquifer Potable water source supplying >50 homes. Outer source protection area for locally important water source. No specific recreational use of waterbody
Low	Attribute has a low quality or value on a local scale	Poor Bedrock Aquifer. Potable water source supplying <50 homes. No water supply from surface water, no abstraction designation for watercourse No amenity value of waterbody
Negligible	Attribute has negligible quality or value on a local site scale	No groundwater supply from a bedrock aquifer inn vicinity of site. Surface water not used for any specific purpose.

Appendix 7-K
Descriptions of Effects (EPA, 2022)

Descriptions of Effects (EPA, 2022)

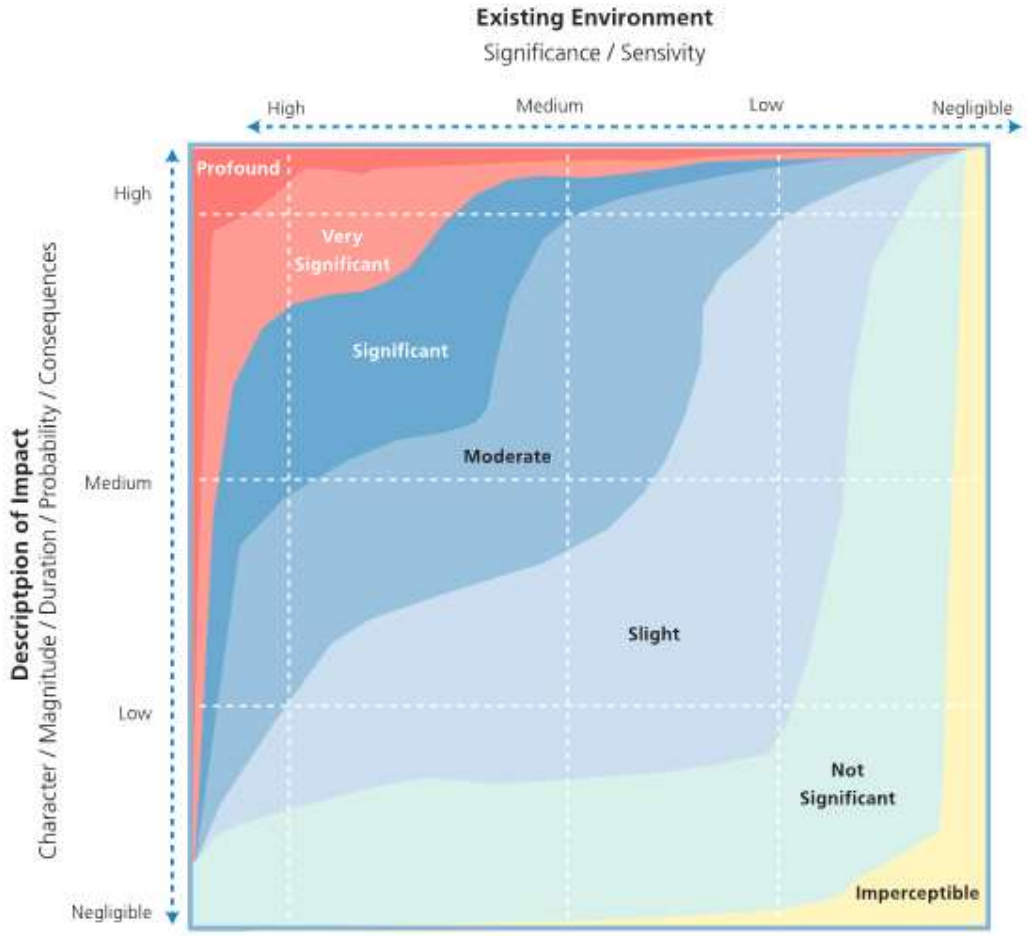
Impact Characteristic	Term	Description
Quality of Effects	Positive Effects	A change which improves the quality of the environment
	Neutral Effects	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error
	Negative / Adverse Effects	A change which reduces the quality of the environment
Describing the Significance of Effects	Imperceptible	An effect capable of measurement but without significant consequences
	Not significant	An effect which causes noticeable2 changes in the character of the environment but without significant consequences.
	Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
	Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
	Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
	Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
	Profound Effects	An effect which obliterates sensitive characteristics
Describing the Extent and Context of Effects	Extent	Describe the size of the area, the number of sites, and the proportion of a population affected by an effect
	Context	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Describing the Probability of Effects	Likely Effects	Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.
	Unlikely Effects	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Describing the Duration	Momentary Effects	Effects lasting from seconds to minutes

Impact Characteristic	Term	Description
and Frequency of Effects	Brief Effects	Effects lasting less than a day
	Temporary Effects	Effects lasting less than a year
	Short-term Effects	Effects lasting one to seven years
	Medium-term Effects	Effects lasting seven to fifteen years
	Long-term Effects	Effects lasting fifteen to sixty years
	Permanent Effects	Effects lasting over sixty years
	Reversible Effects	Effects that can be undone, for example through remediation or restoration
	Frequency of Effects	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually.
Describing the Types of Effects	Indirect / Secondary Effects	Likely, significant effects on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
	Cumulative Effects	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
	Do-Nothing Effects	The environment as it would be in the future should the subject project not be carried out.
	Worst Case Effects	The effects arising from a project in the case where mitigation measures substantially fail.
	Indeterminable Effects	When the full consequences of a change in the environment cannot be described.
	Irreversible Effects	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
	Residual Effects	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
	Synergistic Effects	Where the resultant effect is of greater significance than the sum of its constituents, (e.g. combination of SOx and NOx to produce smog).

Appendix 7-L
Classification of the Significance of Impacts

Determining Significance

The diagram below shows how comparison of the character of the predicted impact to the sensitivity of the receiving environment can determine the significance of the impact.



(Source: Environmental Protection Agency (2022), *'Guidelines on the Information to be contained in Environmental Impact Assessment Reports'*).